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JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania;

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

EDITED

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JANUARY, 1833.

Abstract of the several acts passed at the last session of Congress relative to Patents for useful Inventions, with remarks thereon. By the Editor.

The following resolution was passed by both houses, and approved by the President, March 7, 1832.

"Resolved, by the Senate and House of Representatives of the United States of America, in Congress assembled, That the Secretary of State, out of the proceeds arising from the fees on patents for useful inventions, discoveries, and improvements, procure the necessary books, stationary, and other accommodations for recording the patents issued, and unrecorded, as well as those hereafter to be issued, and that he employ, and pay at a rate not exceeding twelve and a half cents for every hundred words, so many clerks as may be requisite, with convenient despatch, to record the same." And in a general appropriation bill, approved May 5th, fourteen thousand six hundred and twelve dollars were appropriated to defray the necessary expenses. In compliance with this resolution, a considerable number of extra clerks was appointed, and the specifications, amounting to about five thousand which had never been recorded, are all now on record, in proper books.

The universal impression appears to have been, that the patent law actually required that the specification should, in every case, be copied, and attached to the patent, and that it should also be placed on record in the department of state; under the influence of the practice of the office, and of this general impression, we had repeatedly read the first section of the act of 21st February, 1793, without perceiving,

as we think we now do, that such is not the fact. This section provides that after the proper petition has been presented to the Secretary of State, "It shall and may be lawful for the said Secretary to cause letters patent to be made out in the name of the United States, bearing test by the President of the United States, reciting the allegations and suggestions of the said petition, *and giving a short* description of the said invention or discovery, and thereupon granting," &c. "The same shall be good and available to the grantee, or grantees, by force of this act, and shall be recorded in a book, to be kept for the purpose, in the office of the Secretary of State, and delivered to the patentee, or his order." The third section provides that the person soliciting a patent "shall deliver a written description of his invention," "which description, filed by himself, and attested by two witnesses, *shall be filed* in the office of the Secretary of State, and certified copies thereof shall be competent evidence in all courts, where any matter, or thing, touching such rights shall come in question."

It is evident that what the law contemplated, was the inserting in the body of the patent a short description of the invention, and that the patent containing this description should be recorded; the practice, however, is merely to insert in the patent the title of the specification, without any description of the thing patented; and to record the description, but not the patent. We certainly think the practice better than the law, and that the latter ought to be made to conform to the former. This practice probably arose, in the first instance, from the difficulty, and often, in fact, the impossibility, of giving a short description of the thing invented; as the patentee very frequently neglects, or is not able, to give any thing of the kind, it is not possible for the office to supply this deficiency, in a specification; it has therefore in all cases been appended to the patent.

By an act of the 19th of May, the patent granted to Jethro Wood, of the state of New York, for improvements in the construction of the plough, dated September 1st, 1819, was extended for the additional term of fourteen years from its expiration in 1833.

The following is "An act for the relief of Horatio Gates Spafford." "*Be it enacted by the Senate and House of Representatives of the United States in Congress assembled*, That, in issuing letters patent in the usual form to Horatio Gates Spafford, a citizen of the United States, for his alleged discoveries in mechanical philosophy, carried into practical operation by appropriate machinery, it shall be the duty of the Secretary of State, upon application to him, within one year after the passage of this act, to file in the confidential archives of his department, and there preserve in secret, for one year, the descriptions, specifications, and drawings, illustrating the discoveries and inventions aforesaid: and the patent which shall be thus issued, shall have the same force and effect as if conformable in all respects to the provisions of the 'act to promote the progress of the useful arts, and to repeal the act heretofore made for that purpose.'" Approved July 3, 1832.

Since the passing of this act, the individual in whose favour it was enacted, has fallen a victim to the spasmodic cholera; but for this

circumstance we should have animadverted very freely upon his pretentions and claims; being in possession of the information which would have enabled us so to do, without violating any confidence, either real or implied, reposed in us. As the matter stands, our remarks on the subject will be brief, but at the same time, believing that it is intended, on the part of his executors, to take advantage of the act for the benefit of the heirs of the patentee, our duty to the public forbids our passing it over unnoticed; as, however, the Congress of the United States has, by the foregoing act, provided for the sealing of the specification for one year, we do not think it proper to describe the mode in which the patentee pretended to have accomplished his object.

The thing proposed to be done is one which has been very frequently attempted, but which has always failed; the following is an outline of it—the descent, to a certain distance, of a given weight, is to raise a greater weight, say twenty per cent. more, to the same height, in the same time; (water being the agent in the present case.) This is a somewhat startling proposition, and to *the few* who are well grounded in the principles of mechanics, will do something more than throw doubt upon the whole scheme. The great mass, who are easily deceived by the exhibition of pretended perpetual motions, or who, at least, believe that such a thing may be eventually discovered, would venture their money, in the present instance, with *as great* a probability of success, as upon any plan likely to be devised for the same purpose; for ourselves, we should be most unwilling to buy a ticket in a lottery, where we believed that all must draw blanks.

The sealing of patents either for a part or for the whole of their term, appears to be, in some cases, very desirable; still there are objections to it which cannot be easily obviated. What one man has invented or discovered, another may likewise invent or discover; and how is an applicant to know that he is not interfering with rights vested in another having a sealed patent? One of the most desirable features in the patent law is an effective caveat, which should allow time for the completion of an invention, and defend the inventor from those prowling, epicurean cannibals who are seeking to live upon the brains of their fellow men. The English have a caveat, but it is worthless; we have none, nor do we believe that there is any where an existing model by which to frame one; the object, however, we consider as of easy attainment.

In the case before us, we can perceive but one motive on the part of the applicant for wishing a sealed patent, as it was not pretended that the time asked was for the purpose of completing the invention This is manifest from the provision of the act, that "the descriptions, specifications, and drawings, illustrating the discoveries and inventions," shall be placed on file, at the time when the patent is issued. The motive is indeed set forth in the memorial of the applicant, in which he states that the passing of the act in his favour, would enable him to raise "money power;" or, in other words, would have the effect of inspiring that confidence in the validity of the invention as should induce persons to encourage the thing by investments of mo-

ney; and such is the necessary effect of the passing of such a law, the public not recollecting, or not being aware, that those who passed the law knew no more than themselves respecting the merits of the proposed invention.

An act, bearing the same date with that last noticed, was passed, directing the issuing of three patents to three foreigners: one to Thomas Knowles, of Manchester, England, for an improvement in cotton spinning; one to James Long, of Greenock, Scotland, for spinning rope yarn and duck twines; and one to William Steel, of Liverpool, England, for an atmospheric reacting steam-engine. The proper models and specifications for obtaining these patents are to be deposited in the patent office within six months from the time of passing the act; and the rights are to cease and determine if the inventions are not introduced into public use within two years, or upon their being discontinued, at any time for the space of six months.

Whilst it is very desirable that special legislation should be avoided as far as consists with justice, and congress have actually, on this principle, rejected many propositions, but these acts leave the door wide open for applications on the part of foreign non-resident inventors, and we shall find that numbers will, in consequence, seek an entrance. Comity, we think, requires that whilst Americans can obtain exclusive rights in foreign countries, foreigners, under proper regulations, should be enabled to obtain patents here; but this, if proper to be done, should be done by a general law, which should place all upon an equal footing. Among other considerations, it seems scarcely fair that whilst an American must pay fifteen hundred dollars for a patent extending over the British empire, an Englishman should obtain the same right in the United states for thirty dollars. Ought not the principle of countervailing duties to govern in this as in some other cases?

Another act, dated the same as the foregoing, entitled "an act concerning patents for useful inventions," provides in the first section for the publication, annually, in two of the newspapers printed in the city of Washington, of a list of all the patents which have expired during the preceding year, with the names of the patentees, alphabetically arranged.

The second section provides that where a patentee intends to apply to congress to prolong, or renew, the term of a patent, he shall give notice of this intention, at least once a month for three months, in two newspapers published in Washington, and in one authorized to publish the laws in the state, or territory, in which the patentee resides. The petitioner is to set forth the grounds of his application, with the evidence thereon, verified upon oath before a judge or justice of the peace; and this is to be accompanied by a statement of the ascertained value of the thing patented, and the amount of receipts and expenditures which have accrued therefrom.

The third section authorizes the Secretary of State to receive the surrender of a patent, and to grant a new patent upon an amended specification, where, from inadvertence, accident, or mistake, the original specification had been defective.

This provision is in perfect accordance with the decision of the Supreme Court, in the case of E. & H. Raymond *versus* Grant & Townsend, made previously to the passing of this act, and published in the last volume of this journal, p. 308. It is provided also that the new patent shall be liable to the same objections and defences with the original. And that "no public use or privilege of the invention so patented, derived from or after the grant of the original patent, either under any special licence of the inventor, or without the consent of the patentee, that there shall be a free public use thereof, shall in any manner prejudice his right of recovery, for any use or violation of his invention, after the grant of such new patent as aforesaid."

The last act passed in the session, and dated July 13th, is entitled "an act concerning the issuing of patents to aliens for useful discoveries and inventions." By the act of 1800, aliens who have resided for two years in the United States were allowed to obtain patents: in every session, however, special acts have been passed, enabling such as had resided here for a less period of time, to do the same thing. The present act is intended to embrace such cases, and provides that aliens who have made a legal declaration of their intention to become citizens of the United States, may also obtain patents for their inventions. Should the patentee neglect to introduce the thing patented into public use, for the space of one year after the patent has issued, or should its public use be discontinued for the space of six months, or should the patentee not become a citizen at the earliest period when he is entitled to do so, the patent is to determine, and become void, without the necessity of any legal process to annul, or cancel it.

The foregoing does not repeal the provisions of the act of 1800; those aliens, therefore, who have resided for two years within the United States, stand upon a much better footing than those in whose favour the present act was passed, the special provisos of this act not affecting the former.

There appears to be some incongruity in allowing to the non-resident foreigners, Knowles and others, two years for the introduction of their inventions, whilst those who are residents, and have declared their intention to become citizens of the United States, are restricted to one year; perhaps, however, as the former must act through agents, and reside themselves at a distance, it was thought that more time ought to be allowed to them than to residents.

We hope, at no very distant day, to see the several laws upon this subject combined in one harmonious whole, in which the rights of individuals, and those of the public, will be better defined and secured than they now are. The patent laws both of England and France, are under revision; the present advanced state of the arts, the experience which has been obtained respecting the operation of the existing laws, and the opinions and decisions of the courts, may certainly serve as guides in the attempt, and produce better results than could have been obtained under the circumstances which existed when the laws were originally enacted.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Practical Observations on the power expended in driving the machinery of a Cotton Manufactory at Lowell.

In a communication made some months since to Dr. Jones, I proposed offering for publication in the Journal of the Franklin Institute, some trials made on the quantity and power of water requisite to operate a given quantity of machinery, for the manufacture of cotton cloth.

Other engagements have prevented my preparing the article until this time. I offer it for critical examination, and shall feel grateful for the detection and correction of any errors that may be discovered, having no interest in any other than a true result.

The trials were made on one of the Hamilton mills at Lowell, in 1830. The goods manufactured were coarse cotton drillings, from yarn No. 14.

The dimensions of the mill, and the description of the mill work, gear, and machinery, are as follows:—

The building is 155 feet four inches long, by forty-four feet four inches wide, five stories high on the back, and four stories on the front side. The basement story contains the water wheels, and furnaces for warming the mill. The second story contains the carding and other machinery for preparing the cotton for spinning. The third story contains the spinning machinery; the fourth contains the weaving, and the attic story contains the warping, dressing, and drawing, ready for the weaving.

The quantity of machinery is, two willows, two picking machines, forty-three breaker, and forty-eight finisher cards, eight drawing frames, one Taunton speeder, twelve double speeders, thirty-six warp, and thirty-one filling, spinning frames, with sixty-four spindles each, is 4288 spindles; 144 looms, nine warping and twelve dressing frames.

The head and fall of water is thirteen feet.

The mill is driven by three water wheels, each thirteen feet in diameter, and fourteen feet length of buckets, equal in all to forty-two feet length of buckets.

The tops of the water wheels are on a level with the surface of the water in the feeding canal, when the canal is filled to its proper height.

The wheels are such as are denominated breast wheels.

There are three sets of gates for letting the water on to the wheels; the upper gates are one foot, the second two, and the third three feet below the tops of the wheels. The gates draw horizontally, and the water flows through mouth pieces, with openings of the length of the buckets, and three inches in width, giving the water a proper direction to strike the bottoms of the buckets.

The wheels are ventilated by small wooden spouts, passing from the bottoms of the buckets to the opposite side of the wheel, so that no air can be confined within the buckets to prevent their filling

with water. The water wheels, at working velocity, make 6.1 revolutions per minute, equal to 4.15 feet per second, velocity of the circumference of the wheels.

On the periphery of each wheel is a spur gear, composed of sixteen segments of twelve teeth each, equal to 192 teeth. This drives a spur gear with fifty-three teeth, on a horizontal shaft in the basement story, which makes 22.1 revolutions per minute.

On the same horizontal shaft, a bevel gear, with 49 teeth, drives a bevel gear with thirty-four teeth, on each of four upright shafts, which make 31.85 revolutions per minute.

A bevel gear with fifty-seven teeth on each of the uprights, drives a bevel gear with twenty-two teeth on the main drum shaft in the carding rooms.

The main drum makes 82.52 revolutions per minute.

Diameter of main drum 15 inches.

A belt from the main drum drives the card pulleys, which are $12\frac{1}{2}$ inches in diameter, and make 99.02 revolutions per minute.

A pulley, thirty inches in diameter, on the main drum shaft, drives a counter drum $16\frac{1}{2}$ inches in diameter. And a pulley $26\frac{1}{2}$ inches in diameter on the counter drum, drives the double speeder pulleys, which are $12\frac{1}{2}$ inches in diameter, and make 318.6 revolutions per minute.

A belt from a pulley twenty inches in diameter on the main drum shaft, drives a counter drum $10\frac{3}{4}$ inches in diameter. And a belt from the counter drum drives the drawing frame pulleys, which are five and a half inches in diameter, and make 300 revolutions per minute.

Two sets of picking machinery in separate buildings, are driven by a shaft geared from the horizontal shaft in the basement story. The main pulley (on this shaft) in the picker houses, is thirty-four inches in diameter, and makes 101 revolutions per minute.

A belt from the main pulley drives a drum fifteen inches in diameter; and a belt from a pulley $36\frac{1}{4}$ inches in diameter, on the same drum, drives the beater pulleys of the picker, which are seven and a half inches in diameter; and the beaters make 1107 revolutions per minute.

A belt from the fifteen inch drum drives the willow pulley, which is $12\frac{1}{4}$ inches in diameter, and makes 467 revolutions per minute.

A belt from a pulley twenty-eight inches in diameter on the main drum shaft, drives a counter drum, $16\frac{1}{2}$ inches in diameter. A belt from the counter drum drives the pulleys of the spinning frames, which are sixteen inches in diameter, and make 144.41 revolutions per minute.

In the weaving room, a bevel gear, with fifty-seven teeth on the upright shafts, drives a bevel gear with twenty-two teeth on the main drum shaft, which makes 82.52 revolutions per minute.

A belt from a pulley twenty inches in diameter on the main shaft, drives a pulley $21\frac{3}{4}$ inches in diameter on a counter drum. Diameter of counter drum $16\frac{3}{4}$ inches. A belt from this counter drum drives the loom pulleys, which are twenty-six inches in diameter, and make 48.88 revolutions per minute. One revolution of the pulley makes two strokes of the lay, that is, 97.76 strokes per minute.

A belt from a pulley twenty inches in diameter, on the main drum shaft, drives a pulley of twenty-two inches diameter on a counter drum, the diameter of which is 16½ inches. A belt from this counter drum drives a pulley of 20½ inches on a second counter drum. A belt from a pulley fifteen inches in diameter on the second counter drum, drives the dresser pulleys, the diameter of which is 23½ inches, and make 53.05 revolutions per minute.

A belt from the main drum, which is 12¾ inches in diameter, drives a pulley of 16¼ inches diameter on a counter drum, which is ten inches in diameter. A belt from the counter drum drives the warper frame pulleys which are 12⅝ inches in diameter, and make 50.97 revolutions per minute.

The following table shows the power of each kind, and of the whole quantity of machinery, equal to raising the given number of pounds one foot per second, as found by Mr. Colburn, by an accurate dynamometer of his invention.

TABLE FIRST.

Number of machines.	Names of machines.	Parts of machines.	Velocity per minute of parts of machines.	Power of machinery. Single.	Power of drums. Single.	Power of machinery. Total.	Power of drums. Total.	Power of machinery and drums. Total.	Total power of each room.
				lbs.	lbs.	lbs.	lbs.	lbs.	
2	Pickers and 2 willows.							2500	
43	Breaker cards.	Cyl.	96	47	12	2021	516	2537	
48	Finisher do.		96	38	12	1824	576	2400	
8	Drawing frames.			46	22	368	176	544	
12	Double speeders.	F. Roll.	144	125	64	1500	768	2268	
	Carding room.					5713	2036		10249
36	Warp spinning frames.	Flier.	3344	404	20	14544	720	15264	
31	Filling do.		2603	356	20	11036	620	11656	
	Spinning room.					25580	1340		26920
144	Looms.	Lay.	103	50	8	7200	1152		
	Weaving room.								8352
9	Warping frames.			36	21	324	189	513	
12	Dressing do.			226	12	2712	144	2856	
	Dressing room.					3036	333		3369
	Total power of machinery and drums, exclusive of the main gear,	.	.	.	.	.	.	.	48890
	Add for main gear,	.	.	.	.	.	.	.	1784
	Total power of mill,	.	.	.	.	.	.	.	50674

Experiments were made to determine the quantity of water drawn per second, to run said cotton mill for twelve days.

The water was measured by a wheel made for the purpose by Mr. John Dummer, an experienced and skilful millwright; the waste of water was prevented as far as was practicable.

The construction of the wheel and boxing was as follows:

A plank piling was set across the mill race, extending to such a depth and width through and back of the walls of the mill race, as to entirely prevent the circulation or discharge of any water, except through the opening cut for the purpose. Into this opening was fitted a tight plank boxing, extending to the width of the mill race (fifteen feet in the clear,) and ten or twelve feet in length of the mill race.

The bottom planking of the boxing was cut to such a curve as to fit to the wheel, so that one float board should not leave the curve till another had entered.

The wheel was first made in the form of a large drum, fifteen feet long, and twelve feet three inches in diameter outside of the planking. Sixteen sets of arms were then framed and bolted into the wheel, to which were attached the float boards, which were of hard pine, unseasoned, a little over an inch thick, and three feet six inches in depth, making the whole diameter to the extremities of the float boards, nineteen feet three inches.

The edges and ends of the float boards were fitted as close to the boxing as they could be, to move without friction.

The gauge of the wheel at one revolution, deducting the space occupied by the arms and float board, was 2500 cubic feet.

To one of the gudgeons of the wheel was attached a clockwork movement with three indexes, to point out the number of revolutions made in any given time.

During the whole time occupied in the trials, the height of the back water in the mill race was so regulated as to cover the full depth of the float boards, so that the wheel could not revolve without completely filling the wheel with the water discharged from the water wheels of the mill.

The gauging wheel was set so low that this could be done without setting the back water on to the water wheels, so that no obstruction was presented to them on that account.

The table which next follows contains the details of the measurement of the heads of water, and opening of the gates at the different hours during twelve days; the sums of the numbers thus obtained, with the average taken from them, the whole time of observation, the number of revolutions of the wheel, with other particulars, are given in the third table.

Table Second.—Part First.

Three Water Wheels. *Total length of bucket* (3×14) 42 *feet. Opening of upper and 2nd gates the same.*

Days of the week.	Days of the month.	Hours of the day. H. M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's.
Wednesday.	13	8	10.38	22.38	2.70
		9	10.00	22.00	2.68
		10	9.25	21.25	2.64
		11	7.25	19.25	2.58
		12	5.75	17.75	2.79
		1	11.25	23.25	2.60
		2	6.00	18.00	3·00
		3	5.25	17.25	2.98
		4	4.75	16.75	3.00
		5	5.50	17.50	2.90
Thursday.	14	8	10.38	22.38	2.63
		9	9.75	21.75	2.61
		10	9.38	21.38	2.82
		12	8.88	20.88	2.68
		1	13.63	25.63	2.32
		2	9.87	21.87	2.62
		3	9.75	21.75	2.54
		4	9.37	21.37	2.54
		5	9.00	21.00	2.65

Days of the week.	Days of the month.	Hours of the day. H. M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's.
Friday.	15	7	13.00	25.00	2.40
		8	18.12	30.12	2.33
		9	12.00	24.00	2.53
		11	11.63	23.63	2.55
		12	11.75	23.75	2.61
		2	11.75	23.75	2.68
		3	12.12	24.12	2.53
		4	12.75	24.75	2.52
		5	12.50	24.50	2.45
Saturday.	16	7	17.50	29.50	2.18
		8	17.50	29.50	2.18
		9	13.75	25.75	2.44
		10	12.63	24.63	2.60
		11	14.37	26.37	2.32
		12	14.00	26.00	2.45
		2	14.38	26.38	2.40
		3	14.75	26.75	2.41
		4	17.62	29.62	2.58
		5	19.25	31.25	2.20

Days of the week.	Days of the month.	Hours of the day. H. M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's.
Monday.	18	8	17.38	29.38	2.47
		9	12.62	24.62	2.62
		10	12.38	24.38	2.62
		11	12.63	24.63	2.50
		12	11.75	23.75	2.52
		1	19.25	31.25	2.25
		2	13.50	25.50	2.48
		3	11.62	23.62	2.52
		4	11.12	23.12	2.58
		5	11.62	23.62	2.50
Tuesday.	19	8	20.00	32.00	2.20
		9	11.75	23.75	2.55
		10	10.75	22.75	2.64
		11	11.12	23.12	2.51
		12	11.12	23.12	2.48
		1	19.63	31.63	2.51
		2	12.12	24.12	2.45
		3	12.12	24.12	2.42
		4	14.25	26.25	2.60
		5	10.75	22.75	2.61

TABLE SECOND.—PART SECOND.

THREE WATER WHEELS.—*Total length of bucket* (3×14) 42 *feet. Opening of upper and 2nd gates the same.*

Days of the week.	Days of the month.	Hours of the day. H.	M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's.
Wednesday.	20	8		17.25	29.25	2.63
		9		11.37	23.37	2.57
		10		11.00	23.00	2.57
		11		9.63	21.63	2.52
		12		9.62	21.62	2.61
		2		12.00	24.00	2.36
		3		10.75	22.75	2.46
		4		10.75	22.75	2.66
		5		11.38	23.38	2.59
Thursday.	21	8		16.75	28.75	2.06
		9		11.50	23.50	2.54
		10		11.50	23.50	2.44
		11		11.38	23.38	2.51
		12		12.12	24.12	2.35
		1		20.12	32.12	2.30
		2		15.12	27.12	2.43
		3		11.63	23.63	2.58
		4		9.88	21.88	2.54
		5		11.00	23.00	2.36

Days of the week.	Days of the month.	Hours of the day. H.	M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's.
Friday.	22	8		19.75	31.75	2.00
		9		11.12	23.12	2.53
		10		8.75	20.75	2.69
		11		8.75	20.75	2.64
		12		10.00	22.00	2.44
		1		13.50	25.50	2.42
		2		12.13	24.13	2.30
		3		11.75	23.75	2.50
		4		11.75	23.75	2.35
		5		12.50	24.50	2.38
Saturday.	23	7		12.12	24.12	2.20
		8	30	13.38	25.38	2.40
		9		12.62	24.62	2.43
		10		12.13	24.13	2.39
		11		12.00	24.00	2.50
		12		12.00	24.00	2.36
		1		22.37	34.27	2.48
		2		13.88	25.88	2.32
		3		13.37	25.37	2.26
		4		17.00	29.00	2.90
		5		18.88	30.88	2.69

Days of the week.	Days of the month.	Hours of the day. H.	M.	Head on the upper gates. In's.	Head on the second gates. In's.	Opening of each gate. In's
Thursday.	28	7		11.50	23.50	2.33
		8		16.12	28.12	2.30
		9		11.25	23.25	2.45
		10		10.25	22.25	2.56
		11		10.25	22.25	2.42
		12		11.50	23.50	2.28
		1		17.25	29.25	2.20
		2		12.63	24.63	2.35
		3		11.62	23.62	2.20
		4		11.25	23.25	2.52
		5		13.00	25.00	2.19
Friday.	29	7		12.50	24.50	2.40
		8		19.25	31.25	2.00
		9		11.25	23.25	2.41
		10		11.63	23.63	2.56
		11		10.37	22.37	2.42
		12		10.63	22.63	2.45
		1		15.62	27.62	2.35
		2		11.00	23.00	2.42
		3		11.00	23.00	2.44
		4		11.25	23.25	2.46
		5		11.88	23.88	2.40

Table Third.

Aggregate results of table second, with other quantities and deductions.

Days of the week.	Days of the month.	Aggregate of observed heads for upper gates.	Aggregate of observed heads for second gates.	Aggregate of openings of each gate.	Whole time through each day.			Revolutions of gauging wheel through the day.	Total discharge of water each day.	Discharge per second.	Average head on upper gates.	Average head on second gates.	Average opening of each set of gates.	Area of opening of gates.	Theoretical discharge through upper gates.	Theoretical discharge through second gates.	Total theoretical discharge.	Proportion of actual discharge to	theoretical discharge.
		In's.	In's.	In's.	H.	M.	S.		Cubic ft.	Cub.ft.	In's.	In's.	In's.	sq. ft.	Cub.ft.	Cub.ft.	Cub ic.t.		
Wednesday.	13	75.38	195.38	27.87	12	22	20	1713	4282500	96.15	7.54	19.54	2.79	9.76	51.56	83.12	134.68	.71391	1.00000
Thursday.	14	90.01	198.01	23.41	12	30	57	1643	4107500	91.16	10.00	22.00	2.60	9.10	55.52	82.35	137.87	.66120	1.00000
Friday.	15	115.62	223.62	22.60	12	21	45	1670	4175000	93.80	12.85	24.85	2.51	8.79	60.58	84.49	145.07	.64659	1.00000
Saturday.	16	155.75	275.75	23.76	10	5	3	1220	3050000	84.01	15.58	27.58	2.38	8.33	63.31	84.27	147.58	.56925	1.00000
Monday.	18	133.87	253.87	25.06	12	17	24	1570	3925000	88.71	13.59	28.39	2.51	8.79	61.76	85.41	147.17	.60270	1.00000
Tuesday.	19	153.61	253.61	24.97	12	21	30	1560	3900000	87.66	13.36	25.36	2.50	8.75	61.76	84.97	146.73	.59742	1.00000
Wednesday.	20	103.75	211.75	22.97	12	29	0	1590	3975000	88.41	11.53	23.53	2.28	7.98	52.20	74.61	126.81	.69009	1.00000
Thursday.	21	131.00	251.00	24.11	12	29	57	1667	4167500	92.62	13.10	25.10	2.41	8.43	58.66	81.28	139.94	.66185	1.00000
Friday.	22	120.00	240.00	24.25	12	23	50	1520	3800000	85.14	12.00	24.00	2.43	8.50	56.81	80.34	137.15	.62078	1.00000
Saturday.	23	159.75	291.75	22.93	10	24	25	1190	2975000	79.41	14.52	26.52	2.08	7.28	53.51	72.28	125.79	.63129	1.00000
Thursday.	28	136.62	268.62	25.80	12	5	50	1550	3875000	88.98	12.42	24.42	2.35	8.22	56.10	78.47	134.57	.66122	1.00000
Friday.	29	136.38	268.38	26.31	12	14	30	1558	3895000	88.38	12.39	24.39	2.39	8.36	56.76	79.63	136.39	.64799	1.00000
																	Sum,	7.70429	

From the foregoing table it appears that the average discharge per second for the twelve days was 88.70 cubic feet. And the average ratio of actual to theoretical discharge .64202.

The cause of the difference in the openings of the gates, the quantity of water required, &c. on Saturday, compared with the other days of the week, is, that it is customary, on that day, and more particularly in the afternoon, to clean all the machinery, in consequence of which, a small part of it only is in operation at any time.

Another set of experiments was made to determine the relative powers of each room in the mill, by the quantity of water requisite to drive the machinery in it for a given time; and such portions of the machinery were taken as could be kept constantly running during the experiments, and were as follows:—

The machinery in both picking houses; 43 breaker, and 48 finisher cards; eight drawing frames; 12 double speeders, in the carding room; 34 warp, and 26 filling, spinning frames, 3840 spindles, in the spinning room; 130 looms in the weaving room; eight warping, and 12 dressing frames, in the dressing room.

1st Exp't. Main gear and drums alone.	589 sec	.3 rev's.	=7500 cub. ft.	=12.73ft per sec.
2nd Exp't. do and Carding room.	401	4	=10000	=24.94
3d Exp't. do. and spinning room.	415	10	=25000	=60.24
4th Exp't. do. and weaving room.	441	4	=10000	=22.68
5th Exp't. do. and dressing room.	563	4	=10000	=17.76
6th Exp't. the whole mill & gear.	519	20	=50000	=96.34

Now, deducting the power of the main gear and drums from each room, we have,

Main gear and drums, - -		12.73
Carding room, - -	24.94 — 12.73 =	12.21
Spinning room, - -	60.24 — 12.73 =	47.51
Weaving room, - -	22.68 — 12.73 =	9.95
Dressing room, - -	17.76 — 12.73 =	5.03
Making the total quantity per second - -		87.43 cub. ft.

The sum of the parts, therefore, fall short of the whole by 96.34— 87.43 = 8.91 cubic feet per second.

This I account for by the difference of friction produced on the main gear and drums between running light, and their being partially, or fully loaded.

Another set of experiments was made with three rooms on, and one off at a time, alternately.

1st Exp't. Carding room off, run	357 secds.	11 rev's.	= 27500 ft.	= 77.03 — 12.73 = 64.30 per second.
2nd Exp't. Spinning room off,	486	8	= 20000	= 41.15 — 12.73 = 28.42
3d. Exp't. Weaving room off,	435	15	= 37500	= 86.21 — 12.73 = 73.48
4th. Exp't. Dressing room off,	448	16	= 40000	= 89.28 — 12.73 = 76.55
				242.75

242.75 ÷ 3 = 80.92 and 80.92 + 12.73 = 93.65 cubic feet per second, the sum of all the parts.

5th Experiment, the whole mill on, run 533 secds, 20 rev's. = 50000 = 93.81 cubic feet per second. Making between the last of each set of experiments a difference of 96.34 — 93.81 = 2.53 cubic feet per second, with all the circumstances apparently the same. This difference I cannot readily account for, unless it so happened that the picking machinery was on the first time, and, by mistake, left off in the last, which is a circumstance that cannot now be ascertained.

The proportional power, by the last set of experiments, will be

Main gear and drums, - -	12.73
Carding room, - -	80.92—64.30 = 16.62
Spinning room, - -	80.92—28.42 = 52.50
Weaving room, -	80.92—73.48 = 7.44
Dressing room, - -	80.92—76.55 = 4.37
	93.66

Comparison of the several results.

	Proportional power by the dynamometer.	Proportional power with one room only, on at a time.	Proportional power with one room only, off at a time.	Mean proportional power.
Main gear and drums,	.14816	.14561	.13592	.14323
Machinery in carding room,	.12738	.13967	.17745	·14817
Do. spinning room,	.51264	.54340	.56054	.53886
Do. weaving room,	.14493	.11380	.07943	.11272
Do. dressing room,	.06689	.05752	.04666	.05702
	1.00000	1.00000	1.00000	1.00000

In this comparison, I suppose the discrepancy to arise from the difference of friction on the water wheels and main gear, which was not sufficiently experimented upon to be nicely determined.

In experiment No. 6, on the opposite page, the effect produced by the water acting to drive the machinery and gear, was 47350 lbs. the quantity of water expended per second 96.34 cubic feet. The head above the bottom of the wheel, thirteen feet. Now 96.34 × 62½ ×

13=78276 lbs. the power. And 47350 ÷ 78276 = .6049 is the ratio of effect to power expended, power being 1.

All, or any abridgment of the foregoing, as may be found most desirable, is offered for publication to the Franklin Institute of Pennsylvania,

By their very obedient and humble servant,

ITHAMAR A. BEARD.

Note.—On the 129th page, vol. ix. Journal Franklin Institute, I find a notice of a patent granted to Joseph E. Eldred, of Rochester, New York, for an instrument for plumbing and leveling.

This I consider as no new invention, nor so much as a new application of an old principle. I made one of almost exactly similar dimensions and construction as the one described by Mr. Eldred, which I have had in constant use for more than five years, and several of my friends have them in use, patterned after mine.

It is a very convenient instrument for plumbing, and much more accurate than the old mode with a line and bob, and so far as I am concerned, is free for the use of any one who may wish to adopt it.

FRANKLIN INSTITUTE.

Explosions of Steam Boilers.

(Continued from p. 232, vol. x.)

(No. XXX.)

The committee on explosions are indebted to General Charles Gratiot, Chief of the corps of engineers of the United States, for the following communication, which contains a description of the project of James O. Blair, of Louisiana, for securing boilers from explosions. The drawings were lithographed, and the description was drawn up in the engineer department from documents furnished by the inventor.

The first of these drawings is omitted as showing the same defect with that pointed out in the communication of Cadwalader Evans, in the 9th volume of this Journal. Reference may be made to that drawing (p. 91, vol. ix.) in reading the following description, which applies to the first figure of the lithographic drawing.

COMMITTEE ON EXPLOSIONS.

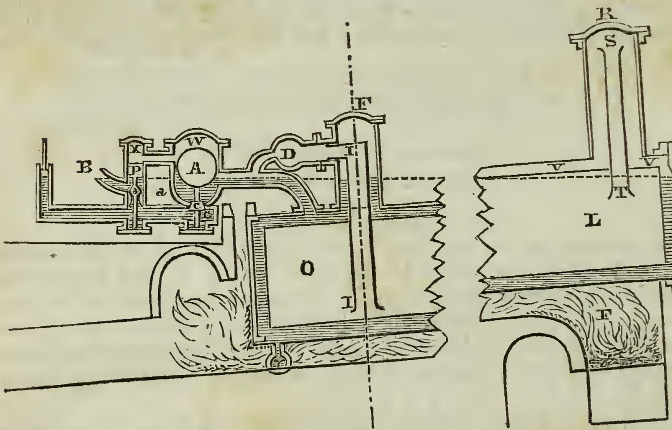
Defect of Connected Boilers.

A transverse section of the six contiguous boilers, of the steam engine used commonly on the western waters, shows that when the boat careens, or leans to one side, a portion of the flue of each boiler on the higher side is exposed to the action of the fire without being protected by water. When the boat resumes its level, the water is thrown into the heated boilers, and a rapid production of steam takes place. Six flues, of fourteen inches diameter, and thus situated, will, if the boilers be twenty feet in length, expose for a careening

in the highest boiler of six inches, to the direct action of the fire, about 140 feet of surface, and the sides of the boilers about thirty feet more, in all 170 feet, the weight of which would be, the iron being taken as one-fourth of an inch in thickness, about 1600 lbs. This at a temperature of 1075° Fah. or a heat which would appear red in the dark, would transform into steam more than ten pounds of water, or its equivalent, one and a fourth gallons, which would be equal to 2125 gallons of steam at a temperature of 350°, or equal to a pressure of more than 120 lbs. to the superficial inch.

The drawing represents six three feet boilers, which are less than the common size for steam-boats of the larger class; consequently, the exposed surface herein shown, is less than it would be in a larger set of boilers with the same angle of careen to which they daily, if not hourly, are exposed, particularly in long voyages.

Fig. 2.



Proposed Remedy.

Fig. 2 represents a longitudinal section through the middle of the centre boiler and hydrostat. The rear end of the boiler is depressed below the front half its diameter, for which reason the back end of the boiler, and for some distance towards the furnace is filled with water as represented by the dotted line P T. The part marked V V shows where the steam is first generated, S T the pipe by which it passes into the steam chest O L, I I is the pipe by which it passes out again into the transverse supply pipe D, which charges the engine.

From this pipe, D, is a communication with the *hydrostat*, or the governor of the quantity of water requisite for the supply of the boilers. This hydrostat is placed on the top of the first boiler, seen in fig. 3. The boilers being full, the surplus water, by the superincumbent pressure of the steam, opens the valve C attached to the buoy A,

through which it passes, and up through the valve *a*, into the waste pipe which conveys it off at the point B. But the moment the pressure of the steam in the boilers has wasted water enough to produce equilibrium, the valve C (below buoy A) being still open, the water passes through the opening of that valve into the boilers, without acting on the piston P, and so on alternately. P is the piston on which the steam rests at X, with all its force, and on which the water only begins to exert an upward force when it becomes too high in the boilers for safety; when this is the case, the piston P, with its valve (*a*) is lifted, and the surplus water escapes at B.

It is important to recollect that it is the *difference* of pressure on the top and bottom of the piston P that causes it to close after it is opened by the action of the water forced by the pump. Those that have been in operation have been proportioned as follows, viz. the lower valve, *a*, has been two inches in diameter, while the valve of the piston P itself was three inches. The square of three being nine, and the square of two being four, the ratio of the pressures will be as nine is to four; hence the piston being acted upon by 900 pounds, and the valve *a* by only 400, the column of water in the waste pipe is cut off by the pressure on the piston the moment the pump ceases to act on the water.

Fig. 3.

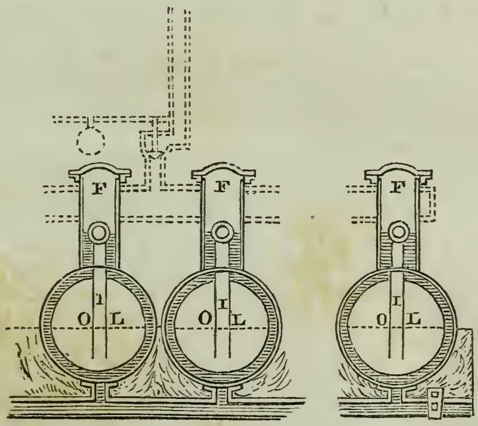


Fig. 3 represents a transverse section of seven* boilers, on the centre one of which the hydrostat is placed. As the fire of the furnace never rises higher than the centre of the boilers, represented by the dotted line O L, O L, &c. it is evident, if the boilers were three feet in diameter, that the boat would have to careen to one side three feet before the water could sink on the higher side of the boat down to

* Only the centre boiler, that next to it, and the extreme boiler, are shown in the cut.—Com. Pub.

the fire line, even if there were any place for the water to run to; but the back end of the boilers being full, the water could only run out of the pipes on the high side, and rise in the same ratio on the lower side; consequently the water could never come down to the fire line.

By a reference to figure 2, it will be seen that the steam is taken into the steam chest at the high or furnace end of the boilers, that this end being below the other end half a diameter, will force the steam to run along the top of the boilers V V on the inside, as fast as it is generated, until it arrives at the nozzle R, in which there is a steam pipe S T, which conducts it into the steam chest O L. At the other end of the boiler, will be seen another nozzle, F, in which the water and steam rise, and from which the steam is taken at D, for charging the engine. This arrangement is important, since, without it, a portion of the water would be drawn over with the steam, and thus injure the working of the engine. These facts have been deduced from experience.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JUNE, 1832.

With Remarks and Exemplifications, by the Editor.

1. For a *Ventilating Machine,* intended either to introduce or displace air, with a view to purification; George Harley, and John Sedgwick, the former of the city, and the latter of the county of Philadelphia, June 1.

This machine is constructed like those blowing machines in which a blast is produced by the revolution of a fan within a drum or cylinder; but the patent is taken for a new application of this machine, and for moving the fan with greater velocity than usual. The fan is constructed exactly in the manner of that most commonly employed in the machines for cleaning grain, there being four vanes revolving on an axis within a drum, which is open at the centre of each head for the admission of air. From the periphery of the drum a tube extends to conduct the air produced by the motion of the fan to any place desired, as, for example, into the hold of a vessel which requires ventillation: by lengthening the tube, we are told that the air may be conveyed to any distance. This, however, is a mistake, as an early limit will be found, the force of the blast decreasing rapidly with the length of the tube.

When it is wished to diffuse the air around the point of delivery, a hollow globe of metal is placed upon the end of the tube, through this ball there is a number of perforations with short tubes radiating from them.

To give a rapid motion to the fan, a wheel is turned by means of a crank, and a band from this wheel passes round a whirl on an axis crossing the bottom of the frame work of the machinery; from a larger

whirl or drum on this axis another band passes round a small whirl on the axis of the fan.

As there is but little novelty in this machinery, it presents but little upon which the patentees could found a claim. The points chosen are the accelerated motion given to the fan; the using the machine for ventilating, and the addition of the copper ball, when required.

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2. For an improvement in the *Saw Mill;* Levi Chapin, Walpole, Chester county, New Hampshire, June 1.

A patent was obtained by Mr. Chapin, for an improvement in saw mills on the 13th of October, 1829, which we have described at p. 30, vol. v. The present is obtained for a still further improvement, the main features of the former being still retained. Instead of straining his saws in a frame, he uses two vibrating beams, the ends of which are segments of curves, of which the fulcrum of the beam is the centre. Straps, or chains, passing around these curved ends, have blocks at their extremities to which the saws are fastened. By means of one beam above, and another below the saws, two of them are strained, and kept parallel to each other. The principal subject of the present patent is the mode in which the beams carrying the saws are made to vibrate by an apparatus which is used as a substitute for the crank. A shaft crosses the frame work of the mill exactly above the upper vibrating beam; the middle part of this shaft is made cylindrical, and from this part fillets project like the square thread of a screw, and pass spirally round a portion of its circumference; a second fillet, similar to the first, and parallel to it, completing the circuit. Upon the upper side of the vibrating beam, projecting pieces are fixed which take on to the fillets, and these, as they revolve, communicate a vibratory motion to the beam by the alternate engagement and disengagement of the two fillets. The principle is in fact the same as that of the cylinder with diagonal grooves, which has frequently been used to produce a reciprocating motion in machinery.

We think this plan very inferior to the ordinary crank motion, for although it produces a similar effect, it is at a greater expense of friction.

The patentee claims, "*particularly*, the cam motion for driving the saws; and the methods described for regulating the saws and the carriages, &c., as well as the manner of communicating motion from a crank to the saw beam through means of a pitman." This latter clause of the claim seems to abandon that part which was *particularly* claimed, and sends us back to the crank by which this kind of motion is usually produced.

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3. For an improvement in the mode of *Manufacturing Cow and Sheep Bells*, and in brazing and bronzing the same; Samuel Booth, Berlin, Hartford county, Connecticut, June 1.

The bells are to be of the usual form, but instead of cutting them out in one piece, by which a great waste of metal is occasioned, the

sides are to be cut in separate pieces, which are to be rivetted together, and then brazed.

Instead of brazing and bronzing them in a smith's forge, nests of them are to be placed in an air furnace, in which anthracite or other fuel may be used. They are thus brazed more economically than in the former mode.

The claims are to the mode of cutting out the sheet iron in two pieces, taking the top and bottom pieces alternately, and rivetting the tops together; also the mode of brazing and bronzing in an air furnace.

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4. For a *Machine for cleaning and dusting Rags for making Paper;* Samuel E. Foster, Brattleboro, Windham county, Vermont, June 1.

Around a shaft of about two feet in length, arms are set spirally, so that in revolving they shall describe a circle of about three feet in diameter. Any number of these are to be placed side by side, and below each of them there is to be a curved bed of wove wire, through which particles of foreign matter may fall into a box below. There is a casing over the entire row of revolving cleaners, and at the end where the rags are admitted a revolving blower, or fan, forces wind through the whole apparatus. A velocity of three hundred revolutions in a minute is to be given to the cleaners; the rags are introduced from the cutting machine, are thrown from one revolving cleaner to the other, throughout the whole range, and the dust is eventually blown out through a trunk leading out of the building. The claim is to the revolving shafts and arms, placed over wire cloth, with the addition of the blower, as described, for the purpose of cleaning and dusting rags.

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5. For a *Churn;* Jeremiah Darrow, Warren, Trumbull county, Ohio, June 2.

The mode of giving a vibratory motion to the dasher of this churn is the thing for which a patent is claimed. A vertical shaft carries the dasher within the churn; upon the top of this shaft, and above the lid of the churn, there is a whirl, round which a rope passes, and this being drawn alternately by its two ends, produces the action desired The ends of the rope are attached to a vertical wheel standing above the churn, which being moved by hand, draws the rope backwarks and forwards.

There are a number of particulars noted by the patentee, which are probably esteemed by him to be points of great importance, but as the whole churn is no better than a thousand others, we shall not detain our readers by particularizing them.

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6. For a machine for *Mixing Clay and Mortar;* Jesse Chapman, Mad River township, Champaign county, Ohio, June 2.

A screen, and a mixing apparatus, are both enclosed in a box, and made to revolve by a winch, and suitable gearing. The screen is

covered with wire, and placed a little inclined in the usual manner of revolving screens. The sand and lime to be mixed are put into a hopper leading into the upper end of the screen; the finer particles pass through the meshes, and the stones fall out at the lower end, which projects through the box.

The mixing shafts, which are below the screen, have pins projecting from, and set spirally around them so as to pass between, and not interfere with, each other. These, by their revolution, incorporate the sand and lime: water, of course, must be supplied, although this is not mentioned in the specification. When clay is to be mixed, the screen will not be required. A door opens at the lower part of the box for the escape of the mortar when sufficiently worked.

The claim is to "the before described machine for mixing clay and mortar; particularly the shafts with the spirally set cutters or mixers, placed obliquely, and in contrary directions; also the revolving screen for screening lime and sand, and the moveable bottom of the hopper."

Revolving shafts, with spirally set cutters, are common in potteries, and we apprehend that any one is free to use an article so well known as a revolving screen, even for the purpose of screening lime and sand; it seems to us that the proper claim, if any is proper, would have been to the particular arrangement or combination of the parts.

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7. For a *Composition, or Paint, to render silk, linen, cotton, and woollen, water proof;* Elijah Winslow, Thomas Chandler, and John Milliken, of Unity, Waldo county, and Hezekiah Winslow, of Dixmont, Penobscot county, Maine, June 4.

We have been frequently at a loss to discover in what way a number of persons can become the conjoint inventors, or discoverers, of one individual fact, or process; and the difficulty is not lessened when it so happens that the invention, or discovery, is one which has been long and extensively known. In the case before us both of these circumstances concur in placing us in a quandary.

The recipe given instructs us to take about eight ounces of gum elastic, to about one gallon of linseed oil, with any dryer which may be preferred, and to boil the whole until the gum is dissolved. After such colouring matter as may suit the purpose has been added to the fluid, the composition, or paint, is fit for use.

The claim is to this method of dissolving gum elastic, for the purpose designated.

We could supply many like recipes, not of our own invention, by which a similar composition may be produced, the main article employed, the caoutchouc, having been tortured in almost every way for the purpose of using it in paint, or varnish.

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8. For a *Grist Mill;* Seaver N. Prentiss, city of New York, June 4.

A weighted lever presses upon the top stone, in order to prevent

it rising. The mode of applying the weight differs from those which have preceded it, but the end attained is the same. The object in view is to grind with stones of from twenty to twenty-four inches in diameter, giving them that force by pressure which they cannot derive from their own weight, and that velocity which shall compensate for their diminished diameter. The claim is to certain particular arrangements, and especially to the manner of weighting.

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9. For a *Grist Mill;* Asael Baron, Windsor, Broome county, New York, June 4.

This is another patent for another mode of keeping the spindle from rising in a portable grist mill. The top of the spindle passes into an iron box affixed to the bridge tree; the box is so contrived as to be readily supplied with, and to retain, the oil necessary to keep the parts lubricated; the construction and other arrangements of the machinery are the same as is usual in such mills.

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10. For an improvement in the *Mode of letting Water on Horizontal Wheels for Mills;* Asael Baron, Windsor, Broome county, New York, June 4.

A horizontal wheel, with radiating buckets, and enclosed in a penstock, is to have the water admitted upon it on opposite points on its upper side, and, of course, in opposite directions; it is likewise to be carried off through two openings constructed for the purpose. When used in a stream, or current, the water is to be admitted through one flood gate only. The whole affair appears to be of a very unpromising character, and we are inclined to believe it will never establish a good one by its performance.

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11. For a *Machine for cutting and heading Nails;* Emerald Mason, Milton, Chittenden county, Vermont, June 6.

In this machine, a nail plate of any length is to be entered between rollers, and by these it is carried forward to the cutters, without being either turned or vibrated, as is usually done, for the purpose of cutting one nail out of the other. A revolving cylinder, in front of these rollers, carries two moveable cutters placed on opposite sides of it; these stand out from the cylinder to a distance equal to that of the width of the nail, the angles which their cutting edges form with it being in directions the reverse of each other. The bed cutter, which in nail machines in general is stationary, is made to vibrate upon a pin passing through the centre of its face, and thus to adapt itself to the reversed directions of the revolving cutters.

The nails as they are cut drop into the spaces between the projections on a kind of cog wheel prepared to receive them, and they are there griped in a way calculated to hold them firmly, and are headed by apparatus operating on either face of the wheel, the heading dies being forced up by toggle joints.

The claim is to " the application of a revolving circular cutter to the cutting of nails, and that so arranged as to cut them without turn-

ing the plate; the application of the feeding rollers; the receiving and holding the nail after being cut, between the cogs of wheels; the application of the lever power, as described, to the heading of the same when so held, and the unparalleled speed with which they are made."

With the exception of the latter, the form in which the claims are made appears to be good, the only question being upon their originality. We do not know whether any one has heretofore succeeded in cutting nails by revolving cutters, but we saw it tried more than twenty years ago. The machinery, however, was not well made, and was much too weak to accomplish its object. An unsuccessful trial, however, is not to militate against one that is successful, neither justice or law admit of this. Should the machine of the present patentee answer as well as he anticipates, it will be one of great value, but still its "unparalleled speed" will be no more the subject of a patent than was the unparalleled speed of Childers or Eclipse.

The patentee says, "It is also *expected* that nails of ordinary sizes may be made at the rate of three hundred to seven hundred per minute."

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12. For a *Steam Engine for raising water;* David Colver, Deer Creek, Madison county, Ohio, June 6.

Were Captain Savary alive, but, alas! he has been dead more than a century, he would smile to see how much the steam engine had degenerated in modern times. He, it is true, invented one for raising water, acting upon the same principle with that now presented to us, but very far superior to it, yet his was superseded by Newcomen's atmospheric engine, and Savary joined in the concern, abandoning his own machine, and little dreaming that its ghost would appear upon the earth after a lapse of ages.

We shall not describe the present machine, but merely repeat the observation, that it resembles Savary's, but is more *simple.*

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13. For a *Pulp Dresser*, to be used in separating the knots, knobs, or grosser particles, in the manufacture of paper: Coleman Sellers, city of Philadelphia, June 6.

(See specification, page 401 of the last volume.)

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14. For a *Figure Lathe;* David H. Mason, city of Philadelphia, June 7.

This is a complex instrument of which we intend hereafter to obtain a drawing, and procure a plate to be engraved; until then we shall not attempt a description of it.

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15. For a *Taylor's Square*, for delineating garments; Andrew Wiswell, Exeter, Rockingham county, New Hampshire, June 7.

A common square, having a long and a short arm, has divisions upon it, which bearing a certain relationship to the breast measure, is to be a complete guide in delineating garments, and to supersede all the more complex instruments which have been contrived for that

purpose. Those who are curious to learn the particulars respecting it, are referred to the patentee, who will sell them a square, and describe its use, better than we can.

16. For a machine for *Cutting Wheel Spoke Tenons;* James Smith, Fayette, Kennebeck county, Maine, June 7.

The main part of this machine is a revolving wheel, which has a groove in the middle of its periphery to receive the tenon of the spoke as it is cut. The rim is thus divided into two faces, upon each of which there are cutters operating like plane irons, and adjustible by screws, and these by the revolution of the wheel cut the tenon. The auxiliary parts consist of the gearing for giving motion to the main wheel, and apparatus to serve as guides for the spokes.

We apprehend that some of the machines previously patented for the same object will not be thrown by for the purpose of adopting the one above described.

17. For a *Churn;* William Lewis, Ashford, Windham county, Connecticut, June 7.

From the land of steady habits we have frequently some very good things, and occasionally some very queer notions; the present contribution we place in the latter class.

A pendulum is to be suspended in a frame, and by vibrating this pendulum the dasher is to be moved up and down. To help the pendulum in its labours, it is, at the end of each vibration, to strike against a spring; or rather springs upon its rod are to strike against a part of the frame work.

Whether or not the patentee adjusts his pendulum so that its vibration shall be made in the time best adapted to the rapidity of the stroke in churning, or how far he has carried his speculations respecting the varying resistance as the butter "comes," and what provision he may have made for changing the centre of oscillation, we are not informed, but due attention has undoubtedly been paid to this part of the subject, in his experimental investigations.

18. For a *Cooking Apparatus*, called "Day's economical furnace, oven, and boiler; Samuel D. and William T. Day, Westfield, Hampden county, Massachusetts, June 8.

A round furnace made of metal, or clay, contains the fuel, and over this furnace, boiling, and other operations, may be performed. There are openings at one side of the furnace, consisting of round holes, or else grate bars, against which is put what the patentees call a tunnel: this is an oven of a particular form in which roasting, baking, &c. are to be carried on. There is no claim made, nor are the superior advantages of the apparatus manifest to us either from the drawing or description, although each of them has been prepared with much care.

19. For a *Mill for grinding, scouring, and hulling Grain;*

Dan. Parmele, and Jonathan Morris, New Troy, Luzerne county, Pennsylvania, June 12.

This is another addition to the list of economical grist mills, which we shall dismiss after giving the claims of the patentees, which are to "the length of the upper spindle; the balancing the upper stone upon a collar of metal, with a round shoulder, made to vary in length in proportion to the thickness of the stone; the manner of running the under stone, and of sweeping out the flour."

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20. For a *Machine for Propelling Thrashing Machines and other machinery*, by horses or other animal power; Thomas D. Burrall, and Jehiel F. Axtell, Geneva, Ontario county, New York, June 13.

This machine for propelling machinery which is itself to be propelled by horse power, is to have a sweep ten feet long, to which the horse is to be geared; on the shaft is a cog wheel to drive a pinion on another shaft, which also has a cog wheel taking into a pinion on a band wheel shaft. These various gearings are to give great velocity, and are well contrived to consume a large portion of power by friction. Among the other grand improvements claimed is "the peculiarly simple, strong, and useful construction and combination of the frame of the horse power machine," which is constructed exactly like a thousand other frames.

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21. For an improvement in the *Tin Kitchen;* George Richardson, South Reading, Middlesex county, Massachusetts, June 14.

This, we are informed, is made like the ordinary tin kitchen, excepting that it is nearly of a square form, with the sides, bottom and back, in entire pieces, to exclude the external air; there, however, is to be a close fitting lid on the top, or in the back, notwithstanding its entire unity. A shelf, or shelves, may be placed on ledges within, or there may be a spit crossing it in the usual way. The tin case, and also the separate peices, are to be so formed and placed as to reflect the heat where it is most wanted.

In what part the claim to a patent resides, we are not informed.

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22. For an improvement in the *Coffee Mill;* Edmund Parker, and Heman White, Meriden, New Haven county, Connecticut, June 22.

This coffee mill is a modification of the cast iron vertical coffee mill most generally in use. There is, however, some difference in the mode of combining the parts, and for these the patent is taken.

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23. For an improvement in *Clocks;* Rufus Porter, Billerira, Middlesex county, Massachusetts, June 22.

Some new combinations are made in the escapement, and in the arrangement by which the hour hand is acted upon. There is to be an alarm, the weight of which, in its descent, acts upon a lever, and causing it to strike upon one of the magic matches, the match is in-

flamed, and this in its turn lights a candle. These are the points claimed.

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24. For *Apparatus for destroying Bed Bugs by Steam;* Benjamin Overman, Greensboro, Guilford county, North Carolina, June 22.

Several years ago an apparatus was figured and described in the London Mechanics' Magazine, and in some of the other periodicals of the day, for destroying bed bugs by steam. It consisted of a boiler somewhat resembling a tea kettle, with a pipe leading from its upper part to conduct the steam into corners and crevices. Below the boiler was a chauffer for containing coals, and a receptacle for catching the ashes.

The apparatus before us is essentially the same, but a form is given to it which will render it more costly, and less convenient to use than the one first noticed. The boiler is to be a double cylinder of tin, the water being contained in the space between them, and the fire being made in the inner one, which forms the furnace. A tube, like that before mentioned, is attached to the upper part of the boiler.

The patentee does not describe the mode of applying his machine, or claim any part of it, and as it is old in principle, his course in this particular has been a correct one.

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25. For a *Surgical Machine for extending the Leg and Thigh;* Joseph Merrill, Glasgow, Barren county, Kentucky, June 22.

The surgical machine described by the patentee, is an instrument for extending a fractured leg, or thigh, and for straightening crooked limbs. The leg and thigh are to be laid on a hollow trough of wood, which is furnished with a joint just under the knee, in order that it may be inflected there if necessary. An apparatus of screws and nuts confines it in its place. Near the lower end of it a foot piece projects up at right angles from the trough, upon which it is made to slide backwards and forwards, by means of a screw to adjust it to the length of the limb. The upper part is to be fastened to the thigh by bandaging, and the foot is to be secured to the foot piece in the same way; by turning the screw last spoken of, the foot will be drawn down, and the limb extended. The following instructions are given for setting a fractured limb—" Apply the machine first to the well limb, and thus ascertain its natural length; fix the machine at that length, and apply it to the fractured limb. If the fractured limb is contracted, turn the screw until it is drawn to the right length."

We presume that the patentee is one of those persons denominated natural bone setters, as the instructions given are not such as we should expect from the skilful surgeon. This, however, is a question of little importance, as every liberal minded man would welcome an improvement in surgical instruments from any quarter; it so happens, however, that the instrument above described is not new in

any one of its essential features. The joint under the knee, with a screw to fix it at any angle, the foot board, and its tightening screw, are figured and explained in several surgical works. They may be seen in fig. 6, plate 515, of the New Edinburgh Encyclopedia, referred to at page 597, vol. 17, Am. Ed.

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26. For a *Rotary Pump*, called the "Spring or drop valve pump;" Eli Kendall, Ashby, Middlesex county, Massachusetts, June 22.

This pump is on the same principle with a number of other rotary pumps, and steam engines. There is an outer cylinder, or drum, with closed ends, and within this an inner cylinder is made to revolve by means of a crank attached to one of its gudgeons which passes through the centre of one of the heads of the outer cylinder. The chamber of the pump is the space between the inner and outer cylinders. This chamber has a partition, or stop, filling it up at one point; at one side of this partition is a tube for admitting, and at the other a tube for discharging water. Two metallic valves, filling the capacity of the tube, slide into the inner cylinder as they alternately pass the partition, being forced to do so by the bearing of their outer ends against a strip or plate of metal which acts upon them as a cam.

There is no claim made, and as we have frequent occasion to remark, little, or nothing, upon which to found one.

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27. For a *Washing Machine;* Ira Avery, Springville, Susquehanna county, Pennsylvania, June 22.

A tub of the diameter of three feet, and a foot and a half in height, has a shaft passing through it by which it is made to revolve. The bottom of the tub is covered with radiating fluted boards, extending to a projecting hoop or rim which converts the outer part of the tub into a circular trough. A conical fluted roller is to revolve upon the fluted bottom, such an inclination being given to the latter as shall adapt it to the form of the conical roller. The tub is placed in a frame with its shaft standing obliquely, and the tub itself, consequently, inclined. The fluted roller revolves on a metallic rod which passes through it, the other end of the rod being formed into a ring, or hook, by which it hangs loosely upon the shaft; by this contrivance the gravity of the roller causes it always to remain on that part of the bottom which the inclination of the tub causes to be the lowest.

There is no claim made, although there is quite as much upon which to found one as there is in a large proportion of the patented washing machines. Tubs with fluted bottoms, and conical fluted rollers, have been patented, but the tubs revolved horizontally, whilst this then, like "the great globe itself," has its axis inclined.

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28. For a *Churn;* Jesse Ladd, Holderness, Grafton county, New Hampshire, June 22.

A vertical tub, with a vertical axis, carrying four, or any other number of dashers, has its gudgeon passing up through the lid of the

churn. A pulley, or whirl, upon the shaft, has a rope round it, and there is a contrivance for drawing upon the two ends of this rope alternately, by means of a lever, thus causing the dashers to vibrate. A similar motion was described in the churn mentioned in No. 5, but the present has the advantage of fewer parts.

The claim is to " the application of the principle of the lever to the shaft of the churn, so as to produce its vibrating motion as above described."

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29. For an improvement in the *Wooden or metal Cock or Spigot;* Jacob Bright, Sunbury, Northumberland county, Pennsylvania, June 22.

This cock, or spigot, is closed by a conical valve, at that end of the barrel, or stem, of the cock which enters the vessel from which the liquor is to be drawn; the spout of the spigot stands at right angles to the stem of it, at the distance of about an inch and a half from its outer end. Within this projecting part is a spiral spring, which keeps a brass wire forced forward, and thus closes the conical valve at the other end. This brass wire passes through a leather collar at the end of the spiral spring, for the purpose of preventing leakage; and when by pressure upon a knob, or button, at the front of the cock, the wire is forced inwards, the liquid is allowed to run, by the opening of the valve.

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30. For a *Machine for manufacturing pins;* John J. Howe, North Salem, West Chester county, New York, June 22.

In the ordinary mode of manufacturing pins, the wire is first straightened in considerable lengths, these wires are then cut, a number at a time, into lengths of six or eight inches; the next operation consists in pointing these wires at both ends, which is also effected a number at a time; as many of the wires as can be conveniently laid upon the index finger, be held down in a row, and rolled over by the action of the thumb, are brought into contact with stones, or file cut disks of steel, in rapid motion, and thus pointed, the same operation being performed on each end. The length of a pin is then cut off by an apparatus again operating on a considerable number, and the pointing and cutting are thus repeated until the whole wire has been used. The operation of heading is performed upon each pin singly; the twisted wire is slipped over the pin, and receives three or four blows in the heading apparatus, which fixes it firmly in its place. With the exception of this last, all the processes are performed upon many wires at one time.

Several machines have been made for the purpose of manufacturing pins; in some of them the heading has been performed like that of cut nails, by heading dies forcing up a portion of the wire of the shank, so as to form the head out of the solid stuff; the pointing, the cutting off, &c. have also been performed in the same machine. In that the description of which is before us, " the wire is straightened, cut into lengths, headed, pointed, and the pin delivered from it in a state ready for whitening." Although upon each individual these

operations are performed successively, they are going on simultaneously upon different pins. Such a machine is of necessity complex, and the full exhibition of its manner of operation would require a considerable number of drawings. All we can at present say upon the subject is, that we have seen pins which were manufactured by it, and which were good, although they were the early products of the first imperfect machine.

We hope soon to hear of the apparatus being in full operation, as from the ingenuity of its construction, and its promising appearance, we think it worthy of a fair trial. The principal questions respecting it which remain to be settled, are, whether, as the pins are made individually, that rapid motion can be given to the machine, and the pins be transferred from one part of the apparatus to another without interfering, so as to deliver them in sufficient numbers to warrant this mode of making them; and whether, from accidental defects in the wire, or from other causes, the parts of the pin will not sometimes take a wrong course, and obstruct the action of the machine. This is not an unfrequent accident in complex instruments which are to perform a considerable number of operations upon the same article. Whitney's card machine, however, may encourage us on such a question.

After particularly describing his machine, the patentee says, that "Although the individual parts of the before described machine, such as the levers, cams, wipers, forceps, dies, wheels, pinions, and other appendages, are the common elements of many other machines, and several of them have been used in instruments for manufacturing pins, and cannot therefore be claimed as new, I have yet so combined them as to give a specific character and action to my machine, producing by these new combinations new and useful results; and it is therefore upon this combination of parts that I mainly rest my claim to its exclusive use." Besides this general claim, there are some individual parts which appearing to be new, are claimed as such.

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31. For an improvement in the *Apparatus for manufacturing Soda Water;* Joseph H. Loring, city of Philadelphia, June 22.

The apparatus described by the patentee he calls a "portable mineral water apparatus, or generator for impregnating soda, or mineral water, mead, &c. with carbonic acid gas." A patent had been previously taken by the same gentleman for an apparatus very similar in its construction, but not having the specification of that patent before us, we do not know what portion of the one now patented is new. He, however, seems to have reduced the gas generator to a more portable size, and he also claims the particular construction of a valve, or stop cock, now used by him; these constitute the whole which we find in the claim.

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32. For machinery for *Dressing Yarn preparatory to weaving* Samuel Batchelder, Saco, York county, Maine, June 22. (See specification.)

33. For an improvement in the *Steam Engine and in its mode of operation;* La Fayette Tibbitts, New Glasgow, Amherst county, Virginia, June 22.

In his petition the patentee sets forth the nature and object of his improvements, stating that " they consist in doing away the crank motion, and the other machinery in the present steam engines, from and after leaving the piston rod, by double racks of cast iron teeth, two spur wheels, two catch wheels, latches and springs, plying between said racks of teeth; also the two water wheels, shafts, and the gearing annexed and attached, and the whole improvements of machinery when all combined and in gear; the steam piston rod when in action operates backward and forward, the double racks of teeth which sets in motion the whole machinery of said improvement, propelling the steam-boat stern foremost as well as head foremost." Although to most of our readers there will be much obscurity in the foregoing announcement of splendid discoveries and magnificent improvements, those individuals who have made themselves acquainted not only with the successful attempts at improving the steam engine, but also with the history of those numerous abortions which have disappointed the pregnant hopes of a host of projectors, will recognise in the foregoing announcement the double rack and ratchet wheels which have frequently been applied to do away with the crank, and thus to substitute a complex and inadequate apparatus for one which is most perfect in its operation, bringing the piston rod, and its massive appendages, from a state of motion to one of rest, in the most gradual and advantageous manner, and preparing the whole for the return stroke without the jolts, the backlocking, and friction, attending the double rack motion, and similar substitutes for it which have been essayed.

We could refer to previous numbers of this journal, to other works, and also to the files of the patent office, as affording abundant evidence that so far, the proposed improvements are old, and have been long since thrown aside as worse than useless.

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34. For machinery for *Spreading Lime upon Land;* Mark L. Wilson, Quakertown, Bucks county, Pennsylvania, June 22.

This machine has a body resembling that of a cart, in which the lime to be spread is contained. The fore and back plank of this receptacle incline inwards towards the axles upon which the wheels of the vehicle revolve; they thus tend to carry the lime towards these axles. There are two wheels each fastened to an axle of iron one and a quarter inch square. Each wheel has its own axle, the two meeting in the middle of the body of the cart, and running in boxes provided for them. There is a slot or opening across the body, within which the axles revolve, and by their square form, serve to crush the lime, which then falls through underneath, as the cart is drawn forward.

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35. For a *Horizontal Current Water Wheel,* and inclined

race wheel; John Nuckalls, and Solomon P. Wheeler, Boliver, Hardeman county, Tennessee, June 22.

Both these wheels have buckets which are suspended from horizontal arms projecting from a vertical shaft. The particular mode of fixing them could not be described without writing a longer article respecting them than we are just now inclined to produce, particularly as we do not see any thing in them which leads to the conclusion that they will surpass in usefulness other wheels of a similar character, and that is saying but little in their favour.

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36. For a method of *Extracting the Alcohol used in the stiffening of Hat Bodies;* William M'Coy, Northumberland, Pennsylvania, June 22.

The hats are placed over a boiler and are covered with a box like a still head, from which a pipe proceeds, entering a worm contained in a refrigerator. Although the alcohol which may be contained in the varnish used in stiffening will be separated by this means, yet as all the heat by which the distillation is effected is produced by the vapour of water which comes in contact with the bodies, it must be obtained in a very diluted state. The patentee, however, has, we presume, ascertained that the process will more than pay the cost.

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37. For *Wheels, or Rollers, for destroying Friction*; James D. Cobb, Lebanon, Warren county, Ohio, June 22.

These friction rollers operate somewhat like those of Garnett, but neither the rollers, or their bearings, are cylindrical. The peripheries of the friction wheels, or rollers, have the form of truncated hemispheroids, and their bearings that of truncated cones, or vice versa. These forms, however, may be varied, and the principle of their action still remain unchanged: thus, for example, the bearing points both of the rollers and of the parts of the gudgeons against which they rest and revolve, may both be spherical. The manner in which the parts are combined could not well be described in words; but the subjoined quotation from the specification will fully explain the views of the patentee.

"From a cursory examination of the above described apparatus, it might be viewed as a mere variation of the well known friction rollers of Garnett, before named; but upon a more careful inspection and comparison, it will be found that they have but little in common between them, excepting the principle of converting the rubbing into rolling friction; the form of my rollers, of their bearings, and of what I have called the box, or shell, being different from his, and also from all others which have been since proposed or made; a difference not resulting from fancy or caprice, but essential to the attainment of the object which I have in view, of making the parts which successively sustain the load, as near as may be mere points, by which all rubbing friction will be as far as is possible avoided. I therefore claim as my invention the general construction and arrangement of the before described apparatus for reducing friction. And first, I

claim the manner of constructing the box, or shell, to receive and guide the axles of the friction wheels, and retain them equidistant from and parallel to each other. Secondly, the particular form given to the friction wheel, and to the rests, or guides, by which they are made to touch each other in a point, or points, only. Thirdly, the mode of tightening or adjusting the rests, or guides, as adapted to friction wheels of my construction, whether made in the precise form herein set forth, or in any other which attains the same end."

Friction wheels upon this construction would undoubtedly operate much better than those of Garnett in one particular, namely, in being free from that effect called gathering, which is unavoidable in long bearings, as perfect truth is unattainable in work of this description, and even if attained, it would soon be lost by any unequal wear of the gudgeons, or other parts. Perfect hardness in the materials used, however, can no more be attained than perfect truth in their formation; and as the bearing in these rollers is but little more than a point, the danger is that when pressed by a heavy load, numerous, though small depressions, will be produced, and these constantly accumulating, interfere with the benefits expected from the proposed construction. When the load is small, and great velocity alone is required, this objection may not exist.

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38. For an improvement in the *Fly Net for Horses;* Henry Korn, city of Philadelphia, June 22.

Two patents for the fly net have been previously obtained by the same gentleman, one on the 12th of September, 1829, the other on the 8th of December, 1831, upon each of which we made some remarks. The present patent is obtained for attaching a crupper to the fly net, by two small buckles, or in some other way. There is no drawing, but a specimen of the invention is mentioned as having been sent to the patent office. For the correctness of this procedure we refer to our former remarks.

The present patent appears to be taken without the slightest necessity for so doing, for if the patent for the fly net itself was valid, no one could, by adding a crupper to it, claim it as his own. If it was invalid, the crupper will not establish it in law, however firmly it may fix it on the horse's back.

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39. For a *Churn;* Simeon Power, Lawrenceville, Tioga county, Pennsylvania, June 23.

This churn, we are informed, "is designed to be an improvement on the common churn, and all other churns now in use," but notwithstanding the goodness of this intention, it is impossible for any article to be superior to itself, and by parity of reasoning it cannot be superior to another which is its exact counterpart. Now it so happens that in the crowd of these instruments which have found their way to the patent office, and have paid thirty dollars a piece for permission to take up their abode there, more than one or two such may be found which are much older inmates than the present one.

The body of the churn is a vertical tub, or box, in which there are two dashers, each filling one-half of its capacity. The two dasher rods are attached to levers vibrating like scale beams. These levers are operated upon by pitmen, which raise one and lower the other at the same time. To aid the labour a fly wheel is added, and there is of course a shaft, and its handles to commence the motion.

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40. For an improved *Hoe;* Benjamin Hinkley, Fayette, Kennebeck county, Maine, June 23.

A steel plate, six or eight inches square, forms the blade of the hoe. In the centre of this plate a socket is fixed, which rises vertically from it to the height of an inch and a half. This socket is to have a bore of about half an inch, and must be sufficiently thick to receive a tapped screw through its side; a piece of common gun barrel would answer the purpose. A piece of iron is fitted into the tube, where it may be tightened by means of a screw; the part that projects out is formed into a tine, and is bent down to an angle of forty-five degrees; this part is then driven into the hoe handle, and the hoe is complete. The design of this construction is to allow the hoe to be turned in any direction, so that either side or corner may be used.

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41. For a mode of *Increasing the power of Steam;* Nathan P. Goodall, Kirtland, Geauga county, Ohio, June 23.

A boiler made in the usual way, is to have a steam tube, proceeding from the top of it, bent down so as to enter the furnace under it; this tube is to be recurved and allowed to cross the fire place any number of times, or it may be used as bars for supporting the fuel. From the fire place it passes into a cistern containing water, into which its open end dips; from this cistern the steam which is generated is to be conveyed to the cylinder of a steam engine, or wherever else it may be required. The steam, in passing through the tube within the furnace, becomes highly heated, which excess of heat is communicated by it to the water in the cistern, a portion of which is thereby converted into steam.

The claim is to heating the steam in tubes after it leaves the boiler; and to the method of regulating its temperature by passing it into a cistern of water.

Although by this process heat may be communicated to the steam, and economy be, apparently, thereby promoted, there will be no small danger of burning the steam tube out, or rather this effect will certainly be produced in a very short space of time. Besides this, whatever degree of pressure exists in the boiler, the pipe, or the cistern, will also exist in the whole of them, as they communicate with each other; whenever, therefore, the steam tube becomes weakened by too elevated a temperature, an explosion will ensue from its giving way.

42. For a *Machine for Moulding and Pressing Bricks;* David Phillips, Natchez, Adams county, Mississippi, June 23.

This machine appears to differ in its general construction from those which we have previously examined; but the description of it is too obscure to admit of our attempting an explanation of its mode of action; we are compelled, therefore, to pass it by.

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43. For an improvement in the construction of *Vats, or Letches, used for Tanning;* William Brown, Herkimer county, New York, June 23.

The first improvement claimed is the constructing the sides of the vats of a single board, or plank, having posts, formed of pieces of scantling both within and without; the lower ends of these pieces or ribs of timber, are mortised into the sills which support the floor. This mode of making them is stated to obviate the necessity for caulking; and to allow any number of vats to be connected without the necessity for double partitions.

The second improvement is in the conveying trough, along which the bark is to be carried to feed the letches. A horizontal beam passes along the top of the trough, being suspended there by means of two vertical rods hanging from cross trees above the trough. This horizontal beam is so hung as to be capable of having a vibratory motion given to it, lengthwise of the trough. From the bottom of it hang leaves, or buckets, which nearly touch the bottom and sides of the trough; these are so hinged as to rise one way, but not the other. By swinging the beam the bark is drawn forward, whilst in passing back, the hinged buckets slide over it, and at their return again advance it.

This patent is obtained as supplementary to one previously granted to the same person for improvements in tanning.

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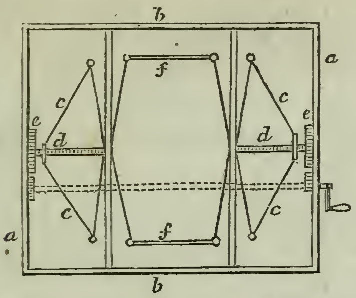
44. For *Improved Lime Kilns;* Samuel Griscom, Reading, Bucks county, Pennsylvania, June 26.

This kiln is to be quadrangular and vertical, twenty feet in length and ten in width, and of a proper height. In erecting it, walls of sixteen or eighteen inches in thickness are to be built parallel to each other, with intervals of eighteen inches between them. These walls are to be ten feet in length, and the extreme ones being about twenty feet apart, become the foundation for the end walls of the kiln. The front and back walls are erected on the ends of the parallel walls, the intervals between which form rows of openings like those of a brick kiln. In one wall there is to be an opening, or doorway, of four feet by five, for introducing the lime stone and fuel. The lime stone is first to form a layer upon the parallel walls, and upon this is to be laid anthracite coal, such layers alternating with each other until the kiln is filled.

Wood is to be placed in the intervals below, and this being ignited sets fire to the coal, which is allowed to burn out.

45. For a *Standing Press;* Aaron Hale, Boston, Massachusetts, June 26.



This standing press is to operate by means of toggle joints, in a way which will be understood by the sketch in the margin. *a a a a* are cheeks, or uprights, framed into *b b*, the top and bottom timbers, *c c c c* are the levers of toggle joints, in the middle of each of these there is a nut through which the screws *d d* work, being turned by means of pinions placed upon a shaft which crosses the press and take into toothed wheels *e e*. There are two platens, *f f*, one of which is forced up and the other down as the levers of the toggle joints are straightened. To increase the power of the press, wheels and pinions occupy the place where the winch is shown.

The articles to be pressed must of course be placed between the two platens, where they will be very powerfully acted upon. We are at a loss, however, to discover to what use this press can be applied; its range will be very small, it cannot be made to follow up any article between the platens after the joints are once brought straight, and it loses its greatest effect excepting they can be straightened; if the goods are susceptible of greater pressure than they have received from this straightening it cannot be given. It will undoubtedly be a press of great power, where all the circumstances necessary to its exertion concur, but when will that be?

We noticed a toggle joint standing press at p. 164, vol. viii., patented also by a gentleman whose name is Hale. The joints in that were operated upon by tackle, a mode of employing power very inferior to that now proposed.

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46. For an improvement in the *Plough;* George Wolf, Fairfield county, Ohio, June 27.

This patent is obtained for an addition to, rather than an improvement in the plough; the object being to combine with the plough an apparatus for planting corn. On the top of the plough, and close to the handles, there is a small funnel shaped hopper, into which is put the grains of corn intended for planting; from this hopper a tube leads down, between the mould board and land side, through which the corn is to be dropped. To regulate the planting there is a sliding piece immediately under the hopper, which is drawn back by a spring, thus cutting off the communication between the hopper and the tube. Under one of the handles of the plough, and close to where it is grasped, there is a trigger, from which a wire leads which acts upon the slide. When the corn is to be dropped, this trigger is pressed, and

the slide brings a regulated quantity of corn over, and drops it into the tube: a scraper behind the mould board covers the corn.

The only objection which we see to this plough, is the impossibility of planting corn by it in regular squares, so that it can be ploughed both ways; it may, we believe, be planted with tolerable regularity in a line in one direction.

47. For an improvement in the *Plough;* George Crowl, Sleepy creek, Morgan county, Virginia, June 27.

A shovel plough is to have the shovel pointed at both ends, like the common coulter, so that it can be turned when one end is worn. The contrivance in this particular is not new, nor do we see any thing in any part of it worthy of particular notice. The whole is described without designating what is considered as new.

48. For *Protecting Ships from Lightning;* Elisha L. Keen, city of New York, June 27.

A truck made of glass is to be placed on the top of the upper mast; and upon each of the mast head caps, covers of glass from half an inch to two inches in thickness are to be placed.

These non-conductors being so placed, we are assured that the commanders of vessels may bid defiance to Jove himself, as they will be "completely secured" against his attacks. We are likewise told that whenever lightning strikes a mast, it always enters at top, disdaining to enter sideways, and that "as the lightning rod of iron attracts and conducts when on perpendiculars, so will glass repulse and protect similarly situated."

Notwithstanding the logic of this conclusion, we are still unconvinced. We should place just as much confidence in a glass night cap, or a bonnet of the same material, to protect the person against the attacks of the thunderer, as we should in these caps to ward off his blows upon the head of a mast. The fact is, that the whole thing manifests an entire absence of information respecting the nature of the power, or agent, a defence against which it is proposed to furnish. The best and the only known security in such a case is a good, and continuous metallic conductor.

49. For a *Horse Power* for propelling machinery; Timothy Showerman, Covington, Genessee county, New York, June 27.

The name of *horse power* has become technical, and is applied to any apparatus by means of which a horse is made to exert his power in propelling machinery; we do not like the appellation, nor do we think that any generic name was needed for apparatus of this description, or that it is applied with any more propriety to the common gin, or the inclined wheel, than it would be to a cart or a stage. But dropping this technological disquisition, let us pay some attention to the machine before us.

We do not, however, turn to this task with any thing like pleasure, as, after a fair examination of all that the patentee has to say in its

favour, we are compelled to disallow its claims, and to pronounce upon it a sentence of condemnation, as not justifying the character given to it.

A vertical shaft is fixed in the usual way, and on the upper end of it is placed a horizontal wheel, with cogs upon its periphery; so far at least all is old. This large wheel is to drive another of one-fourth or one-fifth its diameter, and this last is to act upon a pinion having a drum or band wheel upon its shaft. The large horizontal wheel, we are told, should be of the same diameter as the circle in which the horse walks, say twenty feet, and it is the leverage of this part, we suppose, which is to furnish the extra power. All that the patentee has to say upon this subject is, that he claims the putting of cog wheels together "so as to propel machinery with a less number of horses." We are perfectly willing, let him do so, *if he can.*

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50. For a *Churn;* Isaac Van Gorder, Warren, Trumbull county, Ohio, June 27.

In this churn there are to be two vertical shafts, each of them carrying arms, or dashers, which in their revolution, or vibration, pass between those of its fellow. Upon the top of each of these shafts there is a whirl, or pulley, having a rope passing round it, the ends of which ropes are attached to the periphery of a vertical wheel. By giving a vibratory motion to this wheel, the shafts and dashers are caused to revolve. The claim is to "the manner of applying the cord to the pulleys for the purpose of churning."

The *manner* of doing this, it will be seen, resembles that of another churn patented on the second of this month, (June,) see No. 5. It may be observed that both the patentees reside in the same place. The main difference in the churns consists in the use of double dashers in the last; another churn, similar to these, was contributed by New Hampshire, on the 22d inst. (No. 28,) which has the same moving apparatus, and a single shaft.

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51. For a *Brand, for Branding Barrels, Packages, &c.;* Samuel Huse, Newburyport, Essex county, Massachusetts, June 28.

(See specification.)

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52. For a Tracheater, *for curing the Croup in Fowls;* Thacker V. Bush, Clark county, Kentucky, June 29.

(See specification.)

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53. For a *Circular Rail-way Saw Mill;* Allen B. Reynolds, Cincinnati, Hamilton county, Ohio, June 29.

Most persons have heard something about going round Robin Hood's barn, and we have now an opportunity of presenting a vehicle in which the circuit may be performed.

A circular rim of any required diameter is to be made of wood, and placed horizontally on suitable supports, the *upper face* of this

circle is to be "*shod* with plates of iron," and this forms the circular rail-way. A moveable frame, or carriage, to which the saw mill is attached, is then placed upon the rail-way, having four rollers, or wheels, on its under part, which rest upon the iron facings. The axles of these wheels, or rollers, extend to the middle of the circle, where they are supported in boxes, and have on them fly wheels, and a crank, or cranks, to give motion to the saw frame. The saw mill is constructed in the usual way, the log placed on it, and water, steam, or animal power, applied to turn the frame with the whole of its appendages, log and all, round, when the friction of the rollers upon the rail is to drive the entire machinery.

"The invention here claimed, is the before described method of turning mills and machinery, by causing them to turn on a circular rail-way, and thus giving motion to them by cranks, or other suitable gearing."

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54. For a *Washing Machine;* James M'Collam and Nathan D. Howe, New Petersburg, Highland county, Ohio, June 30.

This machine operates like the common dasher churn, the rod being worked up and down by a lever fixed in the manner of a pump handle. The dasher is made double, with spiral steel springs between the two parts, to allow the lower portion to recede when it comes in contact with the clothes. The bottom of the dasher, and the sides of the tub are fluted. A cover fits the top closely, and steam from a boiler is to be admitted through a pipe. The claim is to "every thing peculiar in relation to the machine, excepting the introduction of the steam." Why except this if it is peculiar?

Specifications of American Patents.

Specification of a patent for an improvement in the mode of Dressing Yarn, by which that preparatory operation in the business of weaving is greatly facilitated. Granted to Samuel Batchelder, *Saco, York county, Maine, June* 22, 1832.

The yarn in its course from the sizing rolls and brushes, to the measuring rolls, is usually dried by the employment of revolving fans, running in boxes; and sometimes a current of heated air is made to blow upon it for the same purpose. By my invention the revolving fans and the heated air are dispensed with, the yarn being effectually dried without their aid. For this purpose I make my measuring rollers hollow, or use separate drying rollers; forming them of copper, or other suitable substance, and cause steam, or heated air, to be conducted through them, by means of hollow gudgeons in the same way in which calender and other rollers are sometimes heated. As the mode of doing this is well known to those in the habit of con-

structing or using such machinery, it does not require to be described by me.

Although I consider steam as the most convenient vehicle of heat in the above apparatus, it is manifest that hot water, metallic heaters, or other articles, may be employed to heat the measuring rollers; I do not, therefore, intend to confine myself to the use of steam exclusively; but what I claim as my invention, is the using of a cylinder of metal, heated by steam, or otherwise, in the usual place of measuring rollers, or in any other situation where they can be placed in contact with the yarn for the purpose of drying it, instead of the fans, or heated air, heretofore employed for that purpose.

SAMUEL BATCHELDER.

Specification of a patent for a Brand for Branding Barrels, Packing Cases, and other articles; denominated the Box and heater Brand. Granted to SAMUEL HUSE, *Newburyport, Massachusetts, June* 28, 1832.

The part by which the branding is effected, is a plate of metal, which has on one of its sides projecting letters or figures, which letters or figures are usually cast with the plate which forms the foundation of the whole apparatus. The plate, however, may be made of wrought metal, and may have shifting letters or numbers when required; and these may slide into a groove, or be otherwise confined to its face. On the upper side of the plate, and near its edges, I usually raise ledges of from one-fourth to three-eighths of an inch in thickness, and from half to three-fourths of an inch in height. I also construct a double box of sheet metal, the two parts of this double box having a space between them, which is usually about three-eighths of an inch; rivets, or straps, being used to keep them in their relative situations; the spaces between these two parts, at its lower edge, receives and fits close on to the ledges on the upper side of the plate. This space may be left void, or may be stuffed with charcoal, or any other bad conductor of heat. A handle rises from the edges of the lower plate, in the form of a bale, allowing the box or cover to be placed under it.

When the brand is to be used, heaters of cast iron, or other material, are placed upon the plate; when it is small, the heater may be in one piece; when large, it may be in two or three pieces. The heater, or heaters, are to be covered by the box, which will prevent the heat from being dissipated.

Instead of having the double box to lift off, it may be attached to the lower plate, and there may be a slide, or door, on one side, to admit the heater, in the manner of the old fashioned box irons. The plate and box may be made round, oval, or in any other desired form, and the instrument may sometimes be used without the box,

but this will not be done where many articles are to be branded, and economy or convenience is consulted.

What I claim as my invention, and for which I ask a patent, is the application of heaters of iron, or other metal, to one side of a metallic plate, having its opposite side furnished with the letters and figures with which barrels, packages, &c. are to be branded. I also claim the use of a box to cover the heaters used in branding, in order to prevent the dissipation of the heat.

SAMUEL HUSE.

Specification of a patent for a TRACHEATER, *for curing the Croup in Fowls. Granted to* THACKER V. BUSH, *Clark county, Kentucky, June* 29, 1832.

To all whom it may concern, be it known, that I, T. V. Bush, of Clark county, in the state of Kentucky, have invented an instrument for curing the disease commonly called the croup in fowls and poultry in general, which instrument I denominate a tracheater, and that the following is a full and exact description thereof, and of the mode of using the same.

I take fine wire, of any suitable metal, and not larger, in general, than that of a cambric needle, but varying in size as it may be found necessary; this wire I wind, or coil, round another wire, so as to form a spiral spring; in winding it, however, I do not do this closely, but allow a space between each coil. The wire when thus wound presents the appearance of a hollow elastic screw. The diameter of the instrument may vary from one-twentieth to one-tenth of an inch, more or less, accordingly as it is intended for very young chickens, or for fowls of a larger size. From four to five inches will be a sufficient and convenient length.

This instrument is to be passed into the trachea, or wind pipe, and to prevent injury in passing, the wire forming the end of the fore coil is bent inward. At the opposite end there is a handle, which may consist of the quill end of a feather, a round piece of wood or any other article which can be conveniently whirled between the finger and thumb; it is then complete, and ready for use.

When the instrument is to be used, the chicken, or fowl, is held on the knee, its mouth opened by the pressure of the finger and thumb of the left hand, and the instrument introduced with the right. In order to do this readily an assistant draws the tongue forward, which exposes the glottis. By rolling the instrument between the finger and thumb it enters very readily, its screw form advancing it without the necessity of using force, and in this way it will descend nearly its whole length. If it meets with any obstruction a slight turn in the opposite direction relieves it, when it is to be gently drawn out, rolling it, whilst retracting it, as though it were

descending. The worms and mucus which have caused, or accompanied, the disease, will be collected between the coils of the wire, and, by repeating the operation, the whole will be removed. The instrument should be lubricated with oil, molasses, or any suitable article.

What I claim as my invention, is the foregoing instrument, made by coiling wire spirally, in the manner, and for the purpose hereinbefore described.

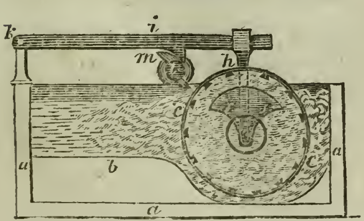
Thacker V. Bush.

Remarks by the Editor.—The affection in Fowls which this instrument is designed to remove, is not the croup, properly so called, but it is highly probable that chickens, said to have the croup, are frequently gorged by the swallowing of worms, and that these may be removed in the way pointed out by the patentee. The patent itself, however, appears to be one of those not likely to prove profitable to the inventor, as individuals will be unwilling to pay much for the use of such an instrument; and when chickens require relief in this way, those who are able to twist a wire, or who have a piece of an old suspender spring, will not undertake to send to the patentee for a right to use it. When the chicken is choaking the disease will not wait for the Doctor.

ENGLISH PATENTS.

Specification of a patent for certain improvements in manufacturing Paper. Granted to John Dickenson, *Esq., January* 10, 1832.

It is obviously a very important point in the manufacture of paper, to obtain a perfectly uniform and smooth pulp, that the article produced therefrom may be of a firm and even texture. To attain this object in a most perfect and least objectionable manner, many contrivances have been patented in this country as well as others. Our readers will observe in the present number, the specification of an American patent for the same purpose; and it is remarkable, that a somewhat similar arrangement has been devised both by the American inventor, and by our own talented countryman, Mr. Dickenson, (who, it must be acknowledged, has done more towards improving the quality of British papers, than any other individual,) the superiority of whose mechanism in this instance, over that of his foreign cotemporary, is very apparent.



The annexed figure is a diagram explanatory of this arrangement: *a a* represents a section of a vat containing the pulp, which is to be regulated by a *waste:* at *b* is a false bottom: *c c* is a rotary cylinder, through which that portion only of the pulp that is to be made into paper, passes;

the knots, grit, &c. being prevented from entering by the wires which envelop the periphery of the cylinder. These wires are arranged spirally by a continuous coil, in the manner of a squirrel cage, but so close together as to leave only the one hundred and fifteenth part of an inch space between them. The wire recommended for this purpose is to be drawn of the figure represented at fig. 14, the narrow, underneath side *d*, being fixed next to the cylinder, where it is to be fastened by rivets to the longitudinal bars *e e;* leaving the uniform space between the coils as before mentioned, which may of course be easily performed by a gauge. The spaces through which the pulp must pass are therefore longitudinal slits, two or three inches long, and only the 115th part of an inch wide. The ends of the cylinder are closed, except at the axis of rotation, which are formed of large tubes; through these the fine pulp received into the cylinder flows off to the mould on which the paper is formed. As there would be a continual liability of the fine interstices of the cylinders becoming clogged, unless some means were adopted to prevent it, Mr. Dickenson employs what is technically termed a float (though it does not possess that precise character,) which by an up and down motion agitates the liquid, and by changing the course of the current, or flow, through the wires, throws off whatever has accumulated on the outside of them. This float is a close vessel of strong copper, of nearly the length of the cylinder (four feet,) and of the sectional figure seen at *f f;* a horizontal bar passes throughout the lower part of this vessel, and also through the tubular axis of the cylinder, beyond the plummer boxes in which the latter turn, where the horizontal bar is fastened to a vertical bar, *h*, at each end, that are connected to a lever *i*, whose fulcrum is at *k*. At *l* is a double cam, put in motion by gear in connexion with the wheel that actuates the rotary cylinder; every revolution of the cam lifts the lever *i* twice, by means of the wipers *m m*, and through the medium of *h*, the copper float *f f* also about $1\frac{1}{4}$ inch each time, and the "float" being somewhat heavier than the fluid in which it is immersed, falls immediately afterwards, producing the required agitation.

A second improvement under this patent consists in the knives usually employed in the transverse cutting of the endless sheets of paper; these are usually two straight-edged blades, one of which being fixed, and the proper length of the paper drawn over it, the other descends and divides the sheet by a similar action to that of shears. In lieu of the upper moving knife with a straight-edge, Mr. Dickenson employs one of an angular or hollow curved form, so that its ends are brought into contact with the lower fixed one. [*Reg. of Arts.*

Remarks by the Editor.—The editor of the Register of Arts is entirely mistaken in his allusion to the American patent, which is that of Mr. John Ames, for *washing rags* in the manufacture of paper, and not for a pulp dresser, the two objects being entirely different. Pulp dressers, on the principle of that of Mr. Dickenson, were patented here at an earlier date.

Patent granted to Isaac Strombon, *for a medical composition or embrocation. Dated December* 17, 1831.

The specification is as brief as a prescription, and not quite so communicative or intelligible. The patentee secures his invention more by the mystery with which he has worded his specification than by the patent itself. His object is to make a composition or embrocation for the cure of certain complaints not specified. The means he uses is to mix up spirits of wine, laudanum, oil of cloves of the best quality, oil of cajeputa, spirits of hartshorn, spirits of camphor, and spirits of turpentine in certain proportions—but what those proportions are, the inventor does not specify. From the nature of the remedies, however, we suspect that the complaint to be attacked is *cholera*, and thence the proportions of these warm and exciting ingredients may be guessed with tolerable exactness.

To sooth pain and stimulate the powers of the body, and at the same time to promote a genial warmth, are objects likely to be achieved by this composition. Of course, it will not be used except by persons who have a patent for making it up, and whose knowledge of similar matters is sufficient to direct them in this.

[*Rep. Pat. Inv.*

Patent granted to John Smith *and* W. Dolier, *Liverpool, for a durable Copy Book, or writing Tablet, and improved Delible Ink to be used therewith. Dated October* 14, 1831.

This is the most clearly expressed of any document we ever read. The invention is useful and novel, and is thus described. Take a piece of fine linen, stitch it on a frame, and rub it with pumice stone till every unevenness of surface is removed.

Then, make a priming of fourteen pounds of single size, of the best and cleanest, to one pound of whiting, and a quarter of a pound of linseed oil; let this be carefully mixed and applied equally over the linen, and when the first coat is dry, rub over with pumice stone and give another coat. Rub down again, and again repeat the sizing.

When this is quite dry, take white lead, Paris white, and linseed oil, mixed to the consistency of molasses, and lay it on with a trowel over the sized linen prepared as above described; give it time (three days) to dry, and repeat this coating also, concluding, however, with fine white lead and turpentine, to produce a dead ground. Care must be taken to let each coating dry regularly, and spread equally, and be sure that the surface is scrupulously rubbed down, and made quite smooth. The linen may then be cut into the right shape and size, and the pages bound in mill boards, or as you will. The copy book is then complete.

The delible ink is thus made. Take a gallon of water; with one pint of it mix one pound of gum arabic, melt it over a slow fire, add-

ing gradually from the gallon of water. If the ink is to be black, pour into the gum mucilage four ounces of fine lamp black, and mix it well by rubbing it between the hands; if any other colour be preferred, any water colour may supply the place of the lamp black.

Now the value of this ink which is delible, is in reference to the prepared copy book; any copy in writing, sum in arithmetic, map in geography, or subject in drawing, may be repeated by the student on his page, and rubbed out with a sponge as often as required. Here are, therefore, facility and economy combined, and, what is rather a dubious advantage, the surface of the paper, and the consistency of the ink, give a peculiar freedom to the writer. This advantage we call dubious, because the student may thence feel a more marked difficulty when he comes to write with common ink on common paper. Nothing, however, can lessen the value of the invention, which is manifest, and we have no doubt that these copy books or slates will be in general demand. [*Rep. Pat. Inv.*

Patent granted to JOHN CHRISTOPHER, *for an improvement in clothes Buttons. Dated October 7*, 1831.

This is the simplest and strongest button we have seen. The disk, or face, may be of copper, or horn, or white metal, or pearl, or shell, or steel, or any other substance, or it may be a mould, covered with cloth, or silk, or vellum, or paper. There is nothing peculiar in the outward face of the button, the novelty is in the shank. This part must project from the button back like a cork from a phial, or the stalk from an auricula, or a daisy. It is not to have an eye, or be turned over to be sewed on the coat as usual; but is to be straight and of some substance. It may be made out of the same piece of metal with the button, or it may be made separately, and soldered or rivetted on to the back of the disk. (The end of the shank is a smaller projection from the shank as the shank is from the button.) Now the novelty of the invention is a washer, or somewhat smaller plate of metal, which is sewed to the inside of the cloth, and when the thickness is pierced with a large bodkin, or stiletto, (as in making eyelet holes,) the shank we have described is put through the cloth, leaving the face of the button outside, and fitting tight into the aperture of the washer inside. It is here rivetted by a few light blows of a small rivetting hammer, and the button is complete.

It is of course exactly the same thing when the washer has the stem or shank, and the button itself the aperture; but in that case the rivet should be made ornamental.

Other plans are suggested; such as to make the shank of the washer a tube, and the shank of the button a rod to fit it. We might suggest another—the shank of the washer being a female screw, and that of the button a male screw, in which case the button could be removed and renewed at pleasure; but whatever mode be adopted, the invention is Mr Christopher's.

It applies to all the buttons in common use, to that of Mr. Sander's patent, and will apply to any button that can be invented. The button will sit closer, and the clothes fit better than by any other process. It will be necessary to have a little anvil covered with cloth, which may be secured to the shop board, and a hammer must always be at hand; with these implements no more is required, and the improvement is easily attainable. [*Rep. Pat. Inv.*

Perkins *on the Generation of Steam.*

The following extract is made from a pamphlet* entitled "Steam Navigation. *Improvements by Jacob Perkins. Part I. The Boiler.*" We give so much as is necessary to exhibit the theoretical views of Mr. Perkins, and his experiments, and to show the application which they have found in his boilers. Com. Pub.

Extract.

Mr. Perkins has observed that, in the process of heating water and other fluids, small bubbles are formed, seeming to adhere slightly to the vessel used, showing themselves long before the liquid begins to boil, and forming more rapidly in situations against which the heat strongly impinges. He has also remarked that, if the heat be intensely strong against portions of a common boiler, the fluid contents are, by the rapid creation of these bubbles, driven off from continued contact with the inner surface of the boiler, and a non-conducting, or slowly conducting partition of vapour, in the shape of bubbles, intervening between the boiler and its fluid contents, the material of the boiler takes up heat much faster than it gives it off to the water: the consequence being that, if the fire be intense, the excess of heat goes into the material of which the vessel is formed, but not freely through it into the fluid contents; and that, in proportion as the heat is increased beyond a limit *hitherto undefined*, so is the rate of boiling decreased, whilst mischief to the boiler is proceeding with augmented force.

Such are some of the observations which led to extensive, and, as they now appear, most valuable experiments. They were further induced by the notice of a fact of every day occurrence. Where the generation of steam has been the particular object in view, as, for instance, with a navigating engine, the engineer, who, by quickening his fire, has expected to increase the volume of steam, has often found himself deceived;—and the greater the intensity to which the fire has been driven beyond a given point, the more decided has been the disappointment arising from a failure to produce the expected and desired effect.

By the following experiment, Mr. Perkins has discovered the cause of such disappointment. He has found that *to produce the maximum effect*, the heat, applied to any boiler of the usual construc-

* For the use of which the committee are indebted to John Vaughan, Esq.

tion for the purpose of evaporating water, must be of one specific degree, which degree he has denominated the *evaporating point.* He has ascertained that whilst any degree lower than this *point* will produce a sluggish and diminutive effect, when compared with the rate of action at the *evaporating point*, so will any higher degree impede the rate of evaporation in proportion as the intensity of heat shall be increased: unless, in order to render available any heat beyond the *evaporating point*, some new means shall be introduced to counteract the repelling power of heated metal, and to force the water into positive and continued contact with it.

The merit of inventing such new means has been reserved for Mr. Perkins, and they will now be described; but first it may be useful to give the experiments, one of which gradually led to this important discovery.

An iron cup, of massive thickness, cast for the purpose, was immersed in a furnace, and raised to a white heat, and, whilst it was allowed to cool gradually, several measures of water were placed in it, one at a time, each in succession, as soon as the previous one had evaporated to dryness.

The 1st measure in evaporating occupied	90 seconds.
2nd ,, ,,	80 ,,
3d ,, ,,	59 ,,
The vapour, or steam, thrown off, began now to appear, and became more distinctly visible with the evaporation of succeeding measures of water.	
4th measure in evaporating occupied	30 seconds.
5th ,, ,,	20 ,,
6th ,, ,,	12 ,,
7th measure showed what Mr. Perkins has termed the evaporating point, and in a dense cloud of steam evaporated suddenly in .	6 ,,
8th measure occupied a longer period, viz:	10 ,,
9th measure in evaporating occupied	20 ,,
10th ,, ,,	32 ,,

and the 11th measure did not boil.

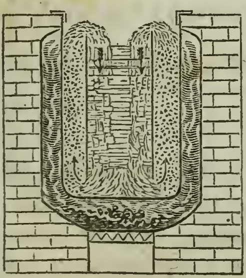
The first measure of water, although contained within the iron cup at a white heat, was perceptibly not in contact with the metal, but was repelled to some distance from it in a state of buoyancy, and there moved freely in every horizontal direction. So circumstanced, the water evaporated slowly; but when, by the evaporation of successive measures, and the lapse of time, the iron was cooled down to the evaporating point, the water then evidently came in contact with the iron, and the augmented rate of evaporation was as 90 to 6, or as 15 to 1, the rate being increased or multiplied fifteen times, or, in other words, a given quantity of water was converted into steam fifteen times as quick at a moderately low, as at an intensely high heat.

How vast a quantity of fuel is thus shown to be worse than use-

lessly applied in the ordinary process of working boilers for steam engine machinery, whether they be used for mining, manufacturing, or navigating operations; or, for the more recently required purposes of locomotive engines.

In applying to useful instead of injurious account, the highest degrees of heat which the strongest fuel can produce, the present invention of Mr. Perkins has proved eminently successful. It is this:—to a boiler is fitted a hollow lining, not extending throughout the boiler, but in proportion to circumstances, in order that a strong circulation in the water may be caused, and that, by driving a perpetual current forcibly against the inner surface of that portion of the boiler exposed to the fire, the whole of the heat may be taken up by the water. And here must be recorded the result of farther experiments. If two vessels be filled with water, one of them placed within the other, and heat be applied to the outer vessel in such a manner that none can reach the inner vessel, except through the water contained in the outer one, no steam bubbles can be made to arise in the inner vessel, whilst, in the outer one, steam bubbles are formed rapidly. The fluid in the outer vessel being composed of a mixture of bubbles and water, that in the inner vessel being water alone,—the contents of the two vessels, although of the same temperature, are of different specific gravities, the mixture of water and bubbles in the outer vessel is lighter than the unmixed water in the inner vessel.

Now if, of the inner vessel, the bottom be taken out, leaving the vessel open at top and bottom, but so placed as to be kept full of water, having its upper edge nearly level with the water surface in the larger vessel, and its lower edge supported at a moderate distance above the bottom of the larger vessel, as shown in the annexed diagram,—the unequal specific gravity of the fluid, when exposed to the action of the fire, will cause it to move in a circulating current.



The bubbles contained in the water of the outer vessel, adjoining the fire, will rise continually to the surface with a power, when at a low temperature, somewhat exceeding the difference in the specific gravity of air and water; but if the number of bubbles be increased by additional heat, the difference between the respective specific gravities will be increased also, inasmuch as a larger quantity of vapour will be present in the water between the inner and the outer vessel, and the rapidity and force of the upward action will augment in a proportionate ratio; and if the heat be greatly increased, augmenting the relative proportion of steam bubbles, still more rapid and powerful will be the force and rate of their current to the surface, (their bursting and giving off the vapour conveyed in them,) whilst the water, in contact with the bubbles, partaking of their influence, will rise in a current also, having a tendency to produce a vacuum in the lower portion of the boiler. At the same time, the fluid in the inner vessel being unmixed with

bubbles of vapour or steam, will, by its greater specific gravity, descend and continually arrange itself under the rising columns of the outer vessel, and so produce a circulating current.

The principle of this action, which is found to exist under numerous shapes of this new boiler, is attended by results of most important value.

It has been shown that the rising current will increase in power and rapidity with every increment of heat applied, and that the descending current will keep pace with it.

If a fire, composed of the strongest fuel, be urged with extreme intensity round a boiler of this construction, so rapid and forcible will be the rising current, that it will draw towards and carry up with it sand, gravel or stones, or almost any kind of heavy substance of moderate size which may happen to be in the boiler, sweeping off, in its ascent, all the steam bubbles which form on the interior surface of the outer vessel, keeping that surface cleared from every kind of vapour which would otherwise act as a non-conductor of heat, or form an impediment to the free passage of heat from the fuel to the water, effectually preventing the adhesion to the boiler of salt, lime, or earthy matter of any kind, and by forcing a continued succession of watery particles into actual contact with the metal, will cause them to take up all the heat at the instant of its formation, and accelerate the production of steam with astonishing rapidity.

Thus may water be converted into steam four times faster than by the common method; or, in other words, by an apparatus of this kind, of one-fourth the size and weight of an apparatus of the common kind, an equal quantity of steam of any required power can be made in a given time, saving

Three-fourths of the space occupied by the ordinary apparatus,

Three-fourths of its weight, and

Three-fourths of the inconvenience and danger arising from its bulky contents of heated water.*

An account of the important and successful results of experimental trials in Demerara, to obtain native raw sugar from the cane juice, by an improved operation of evaporation in vacuo. By Mr. Abraham Booth, experimental chemist, and lecturer on Chemistry and Natural Philosophy.

When England, by her maritime superiority, had obtained the whole of the continental West India possessions, a stimulus was

* The principle upon which the action of this boiler is founded, will, under modifications, prove applicable to many other useful purposes, and with a view to investigate and illustrate them with perfect accuracy, experiments are in progress: for instance—

In the evaporation of brine for making salt.

In the boiling of wort with hops for brewing beer.

In the process of distillation, sugar boiling, &c. the importance whereof will be obvious to individuals engaged in such pursuits.

given to the trade in sugar, which rendered the merchants who were engaged in it, distinguished for their wealth and respectability. Many causes have, however, recently operated in producing a depreciation in the value of this species of property; estates, the profits of which formerly produced annual fortunes, now encumbered by heavy mortgages, are a burden to the proprietors; and the colonies themselves, instead of proving a benefit, are actually a drawback to the mother country. No one connected with the history of our colonial possessions can doubt but that one great cause of this depression is in the inadequate return afforded for a most extensive outlay. When England possessed an almost exclusive monopoly of the supply of sugar to the whole world, plantations formed a very profitable channel for the employment of capital; extensive establishments were formed, and the whole of the land capable of growing sugar cane was put into active cultivation; but the return of peace, and the surrender of a large portion of the collonial conquests, gave the first shock to our West Indian interests, the effects of which have since been so largely and sensibly felt.

Planters, and West Indian proprietors, appear to have been aware that any legislative privilege which the government of the mother country could afford would be inefficient unless it was seconded by their local exertions. The method by which so large a quantity of deteriorated material as they were in the habit of procuring, in the shape of *uncrystallizable sugar*, or *molasses*, might be saved, suggested itself as a valuable consideration. The important advantages which might be anticipated, were this object effected—in a more adequate return from the plantations, and in a necessity for employing so large a number of hands—gave a stimulus to every research. It has thus ever afforded a source of speculative enterprize to industrious schemers, who have always found a market for their projects, however preposterous or visionary. The evaporation of the cane juice in vacuo, at the last stage of concentration, was proposed, not for the purpose of improving the molasses, but to prevent their formation, and thus it differed in its objects from the various schemes which had often been proposed. So often, however, had the planters been injured, and not unfrequently ruined by following the various specious plans which had been imposed upon them, that at its first introduction this process had to combat with all the obstacles which the failures of others had raised up against it. It has, however, already made such progress, that by the most competent judges it is considered to have opened a new era in the history of the colonies; as likely to revive the spoiled fortunes of the planters, and render these possessions a service of benefit, instead of an obstacle to the prosperity of the mother country. It may be noticed as somewhat extraordinary, that at the period when the apparatus was first sent to the colonies, some French adventurers were at Demerara, with a process, for divulging which they required the sum of *ten thousand pounds*, and that the question was then in discussion before the Board of Commerce. The important results of the present improved process, had, however, the effect to put a stop to these negociations, and if the present is not the

perfection of the manufacture, it will, at least, be long before the colonies can boast such an important improvement in their staple commodity and support.

For the introduction of this valuable process, we are solely indebted to the indefatigable exertions of Mr. William Oaks, of Houndsditch; who, after long experience in the manufacture of the apparatus, struggling for a considerable time against those obstacles which naturally impede the introduction of every new invention or application, at last succeeded in gaining the co-operations of an extensive West Indian proprietor at Liverpool, whose attorney on the estate gave every possible facility; it may be considered fortunate, that the attempt met with such valuable co-operation. Thanks are also due to Mr. Thomas Dodson, for his determined perseverance in the erection and completion of the apparatus, and to Mr. Jacob Benson, an English boiler, who has shown considerable practical knowledge, and to whom belongs the credit of being the first to boil the cane juice in vacuo, and produce these desirable results.

I shall offer no further comment before introducing the following able and judicious letter, extracted from the *Guiana Chronicle*, in which are developed the views which led to the introduction of the process, and also the complete success attendant upon the first trials.

From the Guiana Chronicle and Demerara Gazette.

To the Planters of Demerara and Essequibo.

Gentlemen,—The attention which has latterly been excited by the various attempts to improve the manufacture of the staple produce of the colony, whilst it evinces your sense of the importance of the object, and implies a conviction on your part that the manufacture of sugar is susceptible of improvement, also encourages a hope that any communication which may have for its object the accomplishment of so desirable an end, and one so intimately connected with your interests, will, in its turn, meet with its due share of attention.

The respective merits of the several systems which have from time to time been proposed for your adoption, have not only been the subject of much private discussion, but have given rise to some animated discussion in the public prints, in the course of which allusions have been made to the principle of boiling in vacuo.

Several months have elapsed since my arrival in this colony for the express purpose of introducing this scientific system, which, though till now never applied to the original practice of manufacturing sugar from the cane, has, by the advantages resulting from its adoption by the principal refiners in Great Britain, during twenty years' practical operation, acquired the highest reputation. It is the fruit of many scientific experiments and much indefatigable perseverance of a late very eminent chemist; and has received the unqualified approbation of the most eminent of that profession, amongst whom are to be found the names of Sir Humphrey Davy, Drs. Ure, Trail, &c.

Although a long acquaintance with the properties of the vacuum-pan, might have warranted me in soliciting your attention thereto at an earlier period, I considered it not only more respectful to you, but also much more in accordance with the diffidence, which, as a stranger to the profession of a planter, I ought to feel to abstain from so doing, until the applicability of the apparatus to colonial purposes was placed beyond dispute—in other words, until I had completed the erection of an apparatus in the colony. I considered also that by postponing it until then, the subject would be divested of that speculative character, which is always, more or less, attached to new applications; and that instead of having to meet objections, which no doubt would have been raised against the system, whilst its advantages were problematical, I should, upon the successful result of the experiment then making, be enabled to adduce actual results instead of plausible conclusions, and facts instead of reasonings.

The experiment has now been tried, and its effects are equal to our most sanguine expectations. The apparatus has been some weeks in full operation on one of the largest estates in this colony; and its results enable me to offer it to the notice of the sugar planter, as the means of making a superior article, and in a much greater quantity than can be produced by any other process hitherto discovered.

Although it would exceed the limits of this address, to give a detailed description of our apparatus and the process, it may be expected that I should give an outline, and by a few general remarks on the principles upon which this system is founded, point out the connexion between the effects and their causes. It is somewhat remarkable that whilst almost every branch of manufacture has been improved by the advance of science and the general diffusion of scientific knowledge, and its application to practical purposes, that the art of manufacturing sugar should have remained stationary from the time that Bryan Edwards described that process in his History of the West Indies, and that it should be reserved to the planter of the present day to make the attempt to verify his predictions, when he said, "That it was no extravagant hope, that the time would come when the salt of the cane, or what we call sugar, would be made pure, and strike into transparent crystals."

The concentration of the cane-juice on the present mode of making sugar in the boilers, requires a long exposure to the action of the fire, the temperature increasing as the operation advances, until it has acquired its proper grain and consistence, when it may be quoted at 250°.

The length of time required to complete the process varies according to circumstances, and depends much upon the skill with which the boilers are hung, the state of the megass, and the consequent intensity of the heat, &c.

Practical chemists well know how injurious so high a temperature is to the flavour and colour of any delicate extract, its tendency to carbonise being in proportion to its consistence; a desire to counteract which, led to the invention of the vacuum-pan by the late Hon.

Edward Charles Howard, and its application on an extensive scale to the refining of sugar.

The vacuum-pan is a large, strong, copper vessel; its form is elegant and scientific; its parts are manufactured and fitted with so much care and exactness as to exclude the admission of all external air. It is worked by the agency of steam, applied externally between the lower part of the pan, and an outside casing. An air-pump, worked by, and attached to, the steam-engine, is connected by pipes to the upper part of the pan.

The pressure of the atmospheric air on the surface of sugar, or any other liquid, boiling in an open vessel, counteracts the ebullition, and by thus retarding the evaporation, renders either an excessive heat, or a longer exposure to one less intense, unavoidable. The common culinary operations of the kitchen afford us daily proofs of the effects of fire upon animal and vegetable substances, and their tendency to carbonise. Milk, for instance, exposed to a fierce fire, not only contracts colour and a disagreeable taste, but forms a black and adhesive crust on the bottom of the vessel. Meat, fish, eggs, &c., possess this tendency in a greater or less degree; a certain portion of this substance is either entirely destroyed, or undergoes a chemical change, which leaves it little or no identity with the original mass of which it formed a component part.

In the manufacture of sugar in the teache, the destructive effects of excessive heat obtain to an effect beyond what may generally be suspected. It destroys a great proportion of the crystals, or, what is the same, it converts the sirop, which would otherwise crystallize, into molasses, by which the quantity of sugar is very materially diminished, and by the creation of carbon, or colouring matter, deteriorates its quality. By this twofold disadvantage the planter is subjected to a great loss, from which he now possesses the opportunity of relieving himself by the adoption of this system.

The excellence of the principle of boiling in vacuo consists in the exclusion of the atmospheric air, and the consequent removal of its pressure; of being able to perform that operation at from 90° to 100 less heat than is required in an open vessel, at which temperature it cannot possibly sustain any injury in its crystals or its colour.

The crystals, or grain, of the sugar thus manufactured are very large and brilliant. These characteristics give to it a greater superiority over sugar made on the present system. It is also semi-transparent: this proves its purity, or freedom from molasses. The size of the crystals involves a very important consideration as connected with the interests of the planter. It is, I believe, a truth susceptible of mathematical demonstration, that in proportion to the increased size of the grain is the increased weight of the sugar. A piece of candy, when broken to pieces, or in other ways disintegrated, cannot be made to occupy as small a space as before. The greater the number of the fractures, the greater is the number of interstices between them, and consequently the greater room required for their reception; from which it is clear, that any measure of capacity which

contains the least divisions of matter, will contain the greater quantity of weight.

A gallon of sugar of a large grain, and perfectly cured, will outweigh a gallon of sugar equally well cured of small grain. By actual experiments on sugar, made on one estate, four gallons of sugar made in the teache weighed 24lbs.; four gallons made in the vacuum-pan weighed 32lbs.; giving as the result the difference of 8lbs., or 2 lbs. to the gallon, a difference much greater than was anticipated.

The clearing of the liquor from its impurities, previous to being boiled, has been a desideratum in the manufacture of sugar, and many attempts have been made to accomplish so desirable an object, but without success. This operation forms one part of our system, and to it we owe in part the production of so clear a crystal. By attention to the proper consistence, temperature, and previous preparation of the liquor, we have succeeded in this very important department by filtering.

Our system of potting and curing is marked by several important deviations from the usual mode, into which it is not my intention to enter beyond making a few general remarks.

I have before observed that sugar made on this principle exceeds in quantity or weight the sugar made in open vessels (as appeared by experiment) in the proportion of 32lbs. to 24lbs., is an increase of 25 per cent. which I endeavoured to show was attributable to the size of the crystals, and which result corroborates the truth of another observation, viz., that a great proportion of *sirops is converted into molasses by excessive heat.* Now this excess not being required in vacuo, the production of molasses is limited to the proportion which nature has given in the cane, although I am not prepared to state with the confidence and precision which I could wish, what that proportion may bear to the whole saccharine substance; yet it is evident from these data that the operation of curing must be necessarily diminished or assisted in the ratio of the diminished quantity of molasses it is intended to separate. I have also observed that *carbon*, or *colour*, is another effect of the same cause; which being obviated in the improved plan of boiling in vacuo, there exists no necessity to have recourse to those powerful chemical menstrua, which were only calculated to repair an injury sustained in the original process at the expense of quantity. As this injury is proved not to take place in the vacuum pan, the sugar stands in no need of any artificial expedients of this nature.

Having in the course of this letter felt myself warranted in offering the vacuum-pan and accompanying apparatus to the notice of gentlemen connected with sugar estates, and endeavoured to show, by actual results, that the advantages of this system are not chimerical, and by a very imperfect and superficial explanation of the principles which govern its operations, having attempted to convey some general idea of its characteristic features, it only remains for me to inform those gentlemen who may be desirous of further satisfaction on any points connected therewith, with a view of availing them-

selves of its advantages, that as the agent of Messrs. W. Oaks & Son, of London, I shall be happy to afford any additional information.

I am, gentlemen,

Yours very respectfully,

THOMAS DODSON.

Pl. Vreede en Hopp, Demerara, 1*st Feb.* 1832.

The Editor of the *Guiana Chronicle* notices the foregoing communication in the following remarks:—

"We refer to an article on sugar boiling, which we this day insert. We leave it to experienced planters to decide on the practical advantages of the plan. We always avail ourselves with pleasure of every opportunity of submitting to their judgment any proposed improvement in a process of such vital importance to the interests of the Colonies, where such proposals bear the appearance of being the offspring of science, experience, and practicability."

From the samples which I have seen prepared upon different estates, I have no hesitation in stating, that the great desideratum since the cane has been cultivated has now been accomplished—*the preparation of pure sugar direct from the cane juice.* The sugar is obtained in granular crystals, of four and six-sided prisms, terminated by two and three-sided summits, and they are perfectly transparent. It has a very rich mellifluous taste, unknown to that prepared by any other process; it is a purer sweet than even the best refined, and is in no danger of turning into acid in solution, as are other refined sugars.

On the plantations, where this mode of operation has been introduced, it is proved that an addition of 25 per cent. in quantity is obtained; an addition of from 10*s.* to 12*s.* in price per cwt., has been already received for a considerable quantity which has been introduced into the Liverpool market. The apparatus possesses the power to make double the quantity of sugar in the same space of time as the old method.

The advantages of the present improved process consists principally in effecting the last stages of concentration of the juice at so low a temperature as shall merely evaporate the aqueous part without decomposing any portion of the rest. This method of concentration has for twenty-one years been in successful operation in the principal sugar refineries of Great Britain.

The process of the operation is as follows: the canes are crushed, and the juice is concentrated in the usual way, and all extraneous matters are removed by skimming, &c. until the liquor is of nearly equal gravity, water, and saccharine, which is proved by the saccharometer. It is then received into a cistern, from whence it is admitted into a vessel closed against the atmosphere, called a vacuum-pan, and having a double bottom, in which steam circulates, whilst the upper part communicates with an air pump, which, maintaining a partial vacuum, causes the sugar to boil rapidly at a temperature

incapable of decomposing any part of it, or of effecting any changes in its chemical composition.

When sufficiently concentrated, the sugar is discharged into a receiver, called the heater, which is surrounded by steam. Here it is again heated for a short time to strengthen the granulation; and it is then put into very shallow vessels to drain off any small portion of uncrystallizable sirop which may adhere to the crystals. When drained it is placed in trays, and dried in the sun, or removed to the drying house, which, if heated by steam pipes, the same raw sugar can be pressed direct from the curing pans into the stamped loaves, which there is no doubt will soon form a very available and efficient article of commerce.

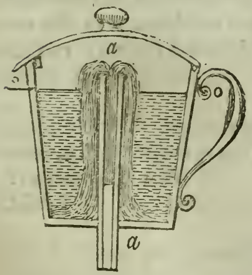
It may be added, that while there is no apparatus to compete with the vacuum principal, there is none so suitable to be put into action, in all climates where the cane is reared, with such beneficial advantages in profit or durability. Its application is particularly adapted for the Mauritius, East Indian, and all foreign sugars, as it possesses a superior advantage in protecting all delicate qualities from decomposition.

On some early occasion I may again trouble your readers with some further observations upon the successive developments and application of the advantages of this system. In the mean time I may mention that samples of the sugar may be seen at the counting house of Messrs. Oaks & Son, 97, Houndsditch, who will communicate any further information upon the subject to any of your readers interested in the inquiry.

London, *July* 14, 1832.

[The sample of sugar which Mr. Booth has been so good as to send with the preceding very valuable communication, fully bears him out in every thing he has said in its favour. It is left at our office, and may be seen there by any person desirous of examining it.—Ed. Mec. Mag.] [*Mech. Mag.*

¶ *On Oiling Machinery.*



Sir,—there are some remarks in your last number, page 270, taken from the Journal of the Franklin Institute, in which it is stated that oiling of axles continually, so as not to waste a drop of oil, had not been done, till the latest improvement in the friction-saving carriage of the Baltimore rail-road.

This may be true as regards America; but in England that desirable object has been accomplished some time, by the axles of Mr. Collinge, Mr. Mason,

Messrs. Theo. Jones, and some others; in each of which, the continual lubrication of the working parts has been carried to great practical perfection.

With respect to the statements of Mr. M'Ilvaine and George W. Smith, Esq. "that the finest sperm oil most effectually relieves machinery from the effects of friction," I beg leave to add my own humble testimony, as well as the corroborative evidence of several scientific friends, to the correctness of this opinion.

One gentleman, an eminent clock maker, informs me that after a series of well conducted and long continued experiments, he has arrived at the conclusion, that the finest sperm oil, when purified, is the very best that can be used for all kinds of watch and clock work; as well as for every other description of well finished machinery, from the smallest lathe to the largest steam engine.

I must certainly differ from Mr. Rennie, "that the more fluid unguents apply best to light loads." My opinion is, that the finish of the working parts interferes more with the character of the unguent than the mere weight of the load. Thus, for instance, with accurately turned, and highly polished, case hardened axles and collars—such as those of Mr. Theo. Jones & Co.—the fluid unguents are the best, whatever may be the weight of the load. While, on the contrary, axles of less exquisite workmanship, in which the friction is consequently much greater—such as the axles of ordinary carts and coaches—are best lubricated by an unguent of greater consistency, although the load upon them may be lighter than in the former case.

A very beautiful method of lubricating the axles of fixed machinery, was contrived some years ago by Mr. John Barton, and, I believe, included in one of his patents. It consisted of a tin vessel, as delineated in the prefixed figure, having a tube *a*, *a*, passing down through it, and a cover to keep out dust, &c. A number of cotton threads were placed with one end down the tube, the other ends laying over the sides, and descending to the bottom of the vessel. The cup being filled with oil to the line *o o*, and the small tube *a* being inserted in the upper gudgeon of the axle, the cotton fibres become a syphon acting by capillary attraction, which slowly and gradually conveys the oil from the vessel down the tube to the axle to be lubricated.

By increasing or diminishing the quantity of cotton, the flow of oil is regulated to suit the consumption of the machine. In the same way, a gradual supply of *water* may be obtained for any required purpose, such as some grinding processes, the nourishment of delicate plants, &c. &c.

I remain, sir,
Yours, respectfully,

July 22, 1832. Wm. Baddeley.

[*Ibid.*

¶ *Weight of anchors, and a statement of the dimensions and weights of Chain Cables, &c. used in the British Navy.*

We have thought that a portion of our readers may derive information of a useful kind from the tables which we give below, and which are taken from the United Service Journal for August, 1832.

COM. PUB.

Weight of Anchors supplied to each class of his Majesty's Ships.

SHIPS.		Bower Anchors.	Stream.	Kedge.
Rate.	Guns.	Cwt.	Cwt.	Cwt.
1st.	Three decked ships from 98 to 120	90 to 95	21	10
2nd	80 and upwards	77 to 80	16	7
3d	70 and less than 80	73 to 76	16	7
4th	50 and less than 70	58 to 68	12	6
5th	38 and less than 50	46 to 50	10	5
6th	24 and less than 26 and 18 gun brigs	20 to 22	8	5

All rates are supplied with four bower anchors, one stream, and one kedge anchor. One of the bowers is technically called the sheet anchor, and another the spare anchor.

Dimensions and Weight of the Chain Cables used on board his Majesty's ships.

RATE.	Inches in diameter.	Equal to hemp cables of	Weight of each chain cable of 100 fathoms in length.
	Inches.	In's. in circumf.	Cwt.
First rate . .	2 1-8	25 to 23	223
74 to 60 guns . .	2	22 to 21	200
50 guns . . .	1 7-8	20 to 18½	160
40 to 42 . .	1 3-4	18 to 17½	150
38 guns . . .	1 5-8	17 to 16½	135
28 guns . .	1 1-2	16 to 15	112½
First rate stream and large sloops	1 3-8	14½ to 14	96
74 guns, stream, and large brigs	1 1-4	13½ to 13	85
Frigates, stream, brigs 10 guns	1 1-8	12½ to 11	64
Stream 600 tons .	1	10½ to 10	50
Stream 500 tons . .	0 7-8	9½ to 9	40
Streams for large brigs	0 3-4	8½ to 7½	30
Small craft . .	0 11-16	7 to 6½	24
do. do. . .	0 5-8	6 to 5	20
do. do. . .	0 1-2	4½ to 4	14

N. B. Each chain consists of eight lengths of twelve and a half fathoms long, united by shackles capable of removal in a moment.

Establishment of Ballast for his Majesty's Ships.

Ships.	Rate.	Proportion.		Remarks.
Ships of 3 decks	1st	1-8th part of their computed tonnage.		Frigates built of fir to have half more than is allowed to those built of oak. Schooners and cutters to have such quantity as may be thought best to suit them. The ballast of ships fitted in wood or cement of twenty-eight guns, having quarter-deck and forecastle, is to be reduced one-fifth of the established quantity, and in flush decked ships and brigs one-third.
do 2 decks	2nd and 3d	1-10th part of their tonnage.		
Large frigates	4th	1-6th	do	
Frigates .	34 guns.	1-5th	do	
do. .	32 do	do	do	
do. .	28 do	do	do	
do. .	26 do	do	do	
do. .	24 do	do	do	
Ship sloops	22 do	do	do	
do. .	20 do	do	do	
Brigs .	18 do	1-7th	do	
do. . .	16 do	do	do	

Note.—The iron ballast is cast in bars or pigs, which vary in weight and dimensions as follows:—

				cwt.	qrs.	lbs.
The pigs of 3 ft. in length	by 6 ins. width	and depth,	weigh	2	3	12
,, $1\frac{1}{2}$,,	6 ,,	and $4\frac{1}{2}$ in depth,		1	0	12
,, 1 ft. 5 in. ,,	$5\frac{1}{2}$,,	$4\frac{1}{2}$,,		1	0	0
,, 1 ,,	$4\frac{1}{2}$,,	$4\frac{1}{2}$,,		0	2	0

Contents, Weight, and Size, of the iron Water Tanks supplied to his Majesty's Ships.

Description of tanks.	Imperial gallons.		Old measure galls.		Weight.			Size.				
	Galls.	Qts.	Galls.	Qts.	cwt.	qrs.	lbs.	Feet	In.	by	Feet	In.
Whole tank.	398	3	478	0	7	0	0	4	0		4	0
Long large half	199	$1\frac{1}{2}$	239	0	4	3	0	4	0		2	0
Square half	197	3	238	0	3	2	0	3	2		3	2
Quarter square	98	3	119	0	2	0	24	3	2		1	7
Large bilge	268	0	312	0	5	2	3	4	0		3	8
Small bilge	110	0	132	0	2	2	20	3	2		2	6
do	110	0	132	0	2	2	20	2	6		3	2
Flat half	188	0	218	0	4	0	0	4	0		2	0

N. B. 224 imperial gallons weigh one ton, and one gallon weighs ten pounds.

The number of Sheets of Copper required to copper a Ship of each Class.

No. of guns each class.	100	98	74	64	50	38	36	32	Ships. Sloops.	Brigs. Large.	Brigs. Small.
No. of sheets each ship.	3923	3609	3357	3018	2846	2291	2267	2230	2162	1089	850

It requires about eighty nails to each sheet.

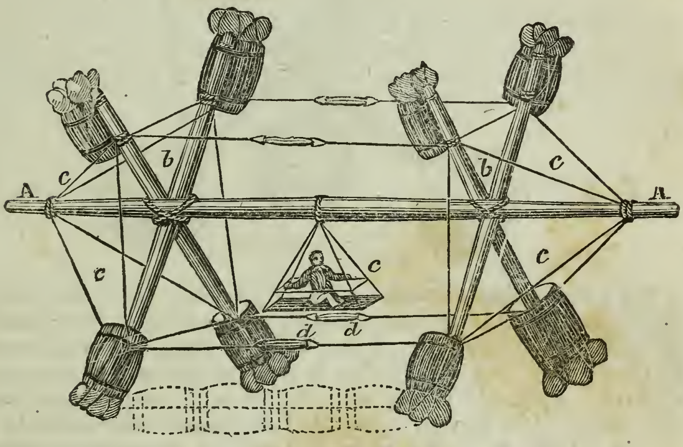
¶ Canning's *Life Raft.*

Sir, it is probable that during the last summer many of your readers may have seen on the river Thames, in the vicinity of New London and Blackfriars bridges, a singular looking machine, composed of spars, and floated by barrels, the object of which was not very apparent.

The machine is, however, one of considerable importance to the maritime world, being a life raft, invented by Mr. Alfred Canning, R. N. for the relief of persons in danger of being shipwrecked; and as a knowledge of its construction cannot be too widely circulated, I submit the following description for insertion in your Magazine.

There are two forms of Mr. Canning's raft, as represented by figs. 1 and 2.

Fig. 1.



In fig. 1, A is a main yard or other spar, with two cross spars *b b* lashed near each end of it, and kept in their places by the ropes or stays *c c*. To give the necessary firmness to the machine, four of the ropes terminate in a loop at *d d*, through which a smaller coil is rove, and braced up *taught.*

The machine is floated by means of empty water casks, one being attached to each end of the cross spars *b b*. The projecting end of each cask is covered with a hammock, to protect them from being stove in by rocks, &c. &c. The number and disposition of the casks, must, of course, be regulated according to the number of persons to be carried. When the number is great it is adviseable to place the barrels as shown by the dotted lines, to obtain sufficient buoyancy. The raft exhibited on the river was so supported.

A platform, *e*, for the reception of passengers, is slung upon the main yard A by a strong loop, so as to turn freely upon it; one or two loops being used, according to the size of platform required. The loops are kept in the middle of the yard by a chock on each side of them.

It will be observed, that only four of the casks can be immersed at one time, and the object of the inventor in using twice that number, is to permit the raft to roll over, without any risk to the parties on the platform *e;* that being suspended as just described, so as to retain a horizontal position whichever set of barrels may be undermost.

Fig. 2.

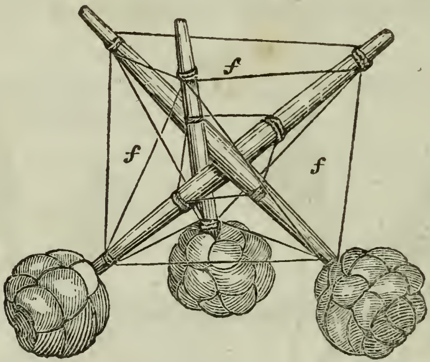


Fig 2 shows another modification of this raft. It is composed of three spars, lashed together crosswise at the middle, and braced up by means of the ropes *f f*. To each end of these spars* is attached an empty cask, or a cork fender, to give the requisite buoyancy. If casks are used, they should be protected with hammocks as before described. The persons upon this raft support themselves in the centre, holding on by the ropes, and shifting themselves whenever the raft rolls over.

It is right to state that the merits of this raft do not rest upon fresh water experiments; Mr. Canning having made numerous trials with it on various parts of the French and English coasts, with invariable success, particularly at Cherbourg and Jersey. At the former place, a raft of the description shown at fig. 1, was drawn out to the head of the jetty in very stormy weather; Mr. Canning having seated himself on the platform, the raft was turned adrift, and was driven by the wind across the mouth of the harbour upon the rocks, and was eventually thrown by the waves, high and dry, upon a shore of the most dangerous character, without any injury either to the machine or to Mr. Canning.

This machine possesses the requisite firmness and stability, with

* For the sake of clearness, only one end so provided is shown in the drawing.

just so much elasticity as is necessary for its safety. It carries the person on it higher, and consequently drier than any other raft, and is perfectly safe and certain on shores where a life boat would inevitably be dashed to pieces. The materials of which it is composed are such as may be found on board almost every ship, and the raft may be put together in a comparatively short period of time.

When a vessel has been wrecked on a lee shore, and a communication formed by means of Captain Manby's apparatus, or the more recent improvements of Mr. Murray, this raft would be found a most eligible mode of landing the crew.

Mr. Canning, some time since, exhibited and explained the construction of his raft, in a lecture delivered to the members of the London Mechanic's Institution, in which he gave an interesting account of several of his experiments in different places; and expressed his readiness to put to sea in the severest storm on any part of the British coast; thereby showing his perfect confidence in the safety and efficiency of his simple life raft.

The Society of Arts have presented Mr. Canning with their large silver medal, as a token of the high opinion they entertain of the ingenuity and utility of his contrivance; and *I guess* it will be some time before they have an opportunity of rewarding another of equal merit.

I remain, sir, yours respectfully,

W. BADDELEY.

London, August 30, 1832. *Mech. Mag.*

¶ DR. ARNOTT'S *Hydrostatic Bed for Invalids.*

We are indebted to Dr. Arnott, the author of the above mentioned inestimable invention, for the following account of it, which he has prepared for the fifth edition of his "Elements of Physics," now in the press.

"In many of the diseases which afflict humanity, more than half of the suffering and danger is not really a part of the disease, but the effect or consequence of the confinement to which the patient is subjected. Thus a fracture of the bone of the arm is as serious a local injury as a fracture of one of the bones of the leg; but the former leaves the patient free to go about and amuse himself, or attend to business as he wills, and to eat and drink as usual—in fact, hardly renders him an invalid; while the latter imprisons the patient closely upon his bed, and brings upon him, first, the irksomeness of the unvaried position, and then the pains of the unequal pressures borne by the parts on which the body rests. These, in many cases of confinement, disturb the sleep and the appetite, and excite fever, or such constitutional irritation as much to retard the cure of the original disease, and not unfrequently to produce new and more serious disease. That complete inaction should prove hurtful to the animal system, may by all be at once conceived; the operation of the continued local pressures will be understood from the following state-

ments. The health, and even life, of every part of the animal body depends on the sufficient circulation through it of fresh blood, driven in by the force of the heart. Now when a man is sitting or lying, the parts of his flesh compressed by the weight of the body, do not receive the blood so readily as at other times; and if from any cause the action of his heart has become weak, the interruption will both follow more quickly, and be more complete. A peculiar uneasiness soon arises where the circulation is thus obstructed, impelling the person to change of position; and a healthy person changes as regularly, and with as little reflection, as he winks to wipe and moisten his eyeballs. A person weakened by disease, however, while he generally feels the uneasiness sooner, as explained above, and therefore becomes what is called restless, makes the changes with much fatigue; and should the sensations after a time become indistinct, as in the delirium of fever, in palsy, &c.; or should the patient have become too weak to obey the sensation, the compressed parts are kept so long without their natural supply of blood that they loose their vitality, and become what are called sloughs, or mortified parts. These have afterwards to be thrown off if the patient survive, by the process of ulceration, and they leave deep holes, requiring to be filled up by a new flesh during a tedious convalescence. Many a fever, after a favourable crisis, has terminated fatally from this occurrence of sloughing on the back or sacrum; and the same termination is common in lingering consumptions, palsies, spine diseases, &c. and generally in diseases which confine the patients long to bed.

"It was to mitigate all, and entirely to prevent some, of the evils attendant on the necessity of remaining in a reclining posture, that the hydrostatic bed was contrived. It was first used under the following circumstances.

"A lady after her confinement, which occurred prematurely, and when her child had been for some time dead, passed through a combination and succession of low fever, jaundice, and slight phlegmasia dolens of one leg. In her state of extreme depression of strength and of sensibility, she rested too long in one posture, and the parts of the body on which she had rested all suffered; a slough formed on the sacrum, another on the heel; and in the left hip, on which she had lain much, inflammation began, which terminated in abscess. These evils occurred while she was using preparations of bark, and other means to invigorate the circulation, and while her ease and comfort were watched over by the affectionate assiduity of her mother, with numerous attendants. After the occurrence she was placed upon the bed contrived for invalids by Mr. Earle, furnished for this case with pillows of down and of air, of various sizes, and out of its mattress portions were cut opposite to the sloughing parts; and Mr. Earle himself soon afforded his valuable aid. Such, however, was the reduction of the powers of life, that in spite of all endeavours the mischief advanced, and about a week later, during one night, the chief slough on the back was much enlarged, another had formed near it, and a new abscess was produced in the right hip. An air pillow had pressed where the sloughs appeared. The patient

was at that time so weak, that she generally fainted when her wounds were dressed; she was passing days and nights of uninterrupted suffering, and as all known means seemed insufficient to relieve her, her life was in imminent danger.

"Under these circumstances, the idea of the hydrostatic bed occurred to me. Even the pressure of an air pillow had killed her flesh, and it was evident that persons in such a condition could not be saved unless they could be supported without sensible inequality of pressure. I then reflected that the support of water to a floating body is so uniformly diffused, that every thousandth of an inch of the inferior surface, has, as it were, its own separate liquid pillar, and no one part bears the load of its neighbour—that a person resting in a bath is nearly thus supported—that this patient might be laid upon the surface of a bath over which a large sheet of the water-proof India-rubber cloth was previously thrown, she being rendered sufficiently buoyant by a soft mattress placed beneath her—thus would she repose on the face of the water, like a swan on its plumage, without sensible pressure any where, and almost as if the weight of her body were annihilated. The pressure of the atmosphere on our bodies is of fifteen pounds per square inch of its surface, but, because uniformly diffused, is not felt. The pressure of a water bath, of depth to cover the body, is less than half a pound per inch, and is similarly unperceived. A bed, such as then planned, was immediately made. A trough of convenient length and breadth, and a foot deep, was lined with metal to make it water tight; it was about half filled with water, and over it was thrown a sheet of the India-rubber cloth, as large as would be a complete lining to it if empty. Of this sheet the edges, touched with varnish to prevent the water creeping round by capillary attraction, were afterwards secured in a water-tight manner all round to the upper border or top of the trough, shutting in the water as closely as if it had been in bottles, the only entrance left being through an opening at one corner, which could be perfectly closed. Upon this expanded dry sheet a suitable mattress was laid, and constituted a bed ready to receive its pillow and bed clothes, and not distinguishable from a common bed but by its most surpassing softness or yielding. The bed was carried to the patient's house, and she was laid upon it: she was instantly relieved in a remarkable degree; sweet sleep came to her; she awoke refreshed; she passed the next night much better than usual; and on the following day Mr. Earle found that all the sores had assumed a healthy appearance: the healing from that time went on rapidly, and no new sloughs were formed. When the patient was first laid upon the bed, her mother asked her where the down pillows, which she before had used, were to be placed; to which she answered that she knew not, for that she felt no pain to direct; in fact, she needed them no more.

"It may be here recalled to mind, that the human body is nearly of the same specific gravity of water, or of the weight of its bulk of water, and therefore, as is known to swimmers, is just suspended or upheld in water without exertion, when the swimmer rests tranquilly on his back with his face upwards. He then displaces water equal

to his own body in weight as well as in bulk, and is supported as the displaced water would have been. If his body be two and a half cubical feet in bulk (a common size,) he will just displace two and a half cubic feet of water, equal in weight to his body. If, however, instead of displacing the water with his mere body, he chooses to have something around or under him which is bulky with little weight, as the mattress of the bed above described, when his weight has forced two cubical feet of that under the level of the water around, he will float with four-fifths of his body above the level, and will sink much less into his floating mattress than a person sinks in an ordinary feather bed. It thus appears, that by choosing the thickness of the mattress, and if unusual positions are required, by having different thickness in different parts, or by placing a bulk of folded blanket or pillow over or under the mattress in certain situations, any desired position of the body may be easily obtained.

"This bed is a warm bed, owing to water being nearly an absolute non-conductor of heat from above downwards, and owing to its allowing no passage of cold air from below. From this last fact, however, less of the perspiration, whether sensible or insensible, will be carried off by the air than in a common bed, and unless the patient can leave the bed daily to let it be aired, it is necessary to lay an oiled silk, or other water proof cloth over the mattress to prevent the perspiration from descending to be condensed on the cloth below; or to place a blanket below to be changed occasionally; or, finally, to lay under the mattress a layer of cork, cut into small pieces, and so connected as to leave passages between, for any desired degree of ventilation. This bed is, in itself, as dry as a bed can be, for the India-rubber cloth (of which bottles can be made) is quite impermeable to water, and the maker is now preparing cloth expressly for this purpose. Then, as Sir Humphrey Davy recommended that his safety-lamp should be double, some persons may prefer a double sheet to obviate the possibility of accident. Unlike any other bed that ever was contrived, it allows the patient, when capable of only feeble efforts, to change his position, almost like a person swimming, and so to take a degree of exercise, affording the kind of relief which, in constrained positions, is obtained by occasional stretching, or which an invalid seeks by driving out in a soft springed carriage. It exceedingly facilitates turning for the purpose of dressing wounds, for, by raising one side of the mattress, or depressing the other, or merely by the patient's extending a limb to one side, he is gently rolled over, nearly as if he were simply suspended in water; and it is possible even to dress wounds, apply poultices, or place vessels under any part of the body without moving the body at all; for there are some inches of yielding water under the body, and the elastic mattress may, at any part, be pushed down, leaving a vacant space there, without the support being lessened for the other parts.* Then, with all the advantages which other invalid beds possess, and with those which are

* The editor of the Register can add his testimony to the perfect accuracy of this statement, having lain upon one of these hydrostatic beds, and experi-

entirely its own, it may yet be made so cheaply, that even in hospitals, where economy must prevail, it may at once be adopted for the benefit of the bed-ridden. Mr. Earle, within a few days of seeing the first one, had others made for patients in St. Bartholomew's hospital, and has been as much pleased with the results of them as of the first. The bed has since been introduced into St. George's hospital by Mr. Keate, and elsewhere. The author has now seen enough of the effects of this bed, to make him feel it a duty to publish a notice of it. With it, evidently, the fatal termination called sloughing, now so common, in fevers and other diseases, need never occur again. And not only will it prevent that termination, but by alleviating the distress through the earlier stages, it may prevent many cases from even reaching the degree of danger. Then it is peculiarly applicable to cases of fractured bones, and other surgical injuries; to palsies, diseases of the hip joint and spine; and universally where persons are obliged to pass much time in bed. And in all classes of curvature of the spine, either actually existing or threatened, it affords a means of laying a patient in any desired position, and with any degree of pressure incessantly urging any part of the spine back to its place. If used without the mattress it becomes a warm or a cold bath, not allowing the body, however, to be touched by the water; and in India it might be made a cool bed for persons, either sick or sound, during the heats which there prevent sleep and endanger health. There are numerous other professional adaptations and modifications of it which will readily occur to practitioners sufficiently versed in the department of natural philosophy (hydrostatics,) to which it belongs. Before reflection, a person might suppose a resemblance between it and an air bed or pillow, calling this a water bed or pillow, but the principles of the two are perfectly distinct or opposite. An air pillow supports by the *tension of the surface* which encloses the air, and is therefore like a hammock, or the tight sacking under the straw mattress of a common bed, and really is a hard pillow; but in the hydrostatic bed there is no tense surface or web at all: the patient is floating upon the water, on which a loose sheet is laying, merely to keep the mattress dry, and every point of his body is sup-

enced that wonderful ease and softness—that absence from all sensible pressure, and the almost imperceptible effort that is required to move or turn about when upon it. He was permitted to experiment upon the utility and advantages it afforded when upon a recent visit to a near relative, at the admirable establishment for the cure of mental diseases at High Beech, near Woodford, instituted, and constantly superintended by Dr. M. Allen, (author of a valuable book on Insanity, and of various medical, moral, and philosophical works,) and of whose establishment the editor feels it his duty to state, that it consists of two neat and roomy villas, about a quarter of a mile apart, in connexion with sixteen acres of gardens, fields, and pleasure grounds, quite of the Arcadian order: the site is lofty, in a very open part of Epping Forest, and commands very extensive and picturesque views. Here, surrounded by a salubrious atmosphere, with liberty to roam apparently unrestrained, with varied amusements, recreation, or employment provided, and parental care, the unfortunate, but yet comparatively happy, patients, receive all the benefit which it is possible for the most enlightened benevolence to bestow.

ported by the water immediately beneath it. To recall the difference here described, and which is of great importance, the bed is better described by the appellation of *hydrostatic bed* than of *water bed.*

[*Reg. of Arts.*

Detonating Lock.

Mr. N. Waterbury, of 26 Newcastle street, Strand, has invented a new lock on the detonating principle, intended for firing ship's cannon. This machine is comprised in a small brass case, which is readily attached to the priming field, and is fired by a lanyard, in the same manner as practised on board of his Majesty's ships, without interfering with the line of sight. The lever by which the detonating powder is fired, is very powerful, and, as it falls immediately over the touch-hole of the gun, the inventor has given it a slight horizontal motion, by which it slips aside after falling, leaving the vent free to be stopped. One of the principal merits of this invention consists in the application of small paper cases, for containing the detonating powder, and which may be used with the common priming tube, or with powder alone. This lock is applicable to artillery of all descriptions, and should it be contemplated to introduce the detonating principle into the government service, Mr. Waterbury's invention is well worthy of consideration.

[*Lond. Jour.*

The Aracacha.

The *Recueil Industriel* for December, gives the following slight account of the above root, a case of which had become spoiled during its transmission to France.

The aracacha grows naturally in New Grenada, and in other parts of Columbia, where it is known under the name of *Apio*, and is considered as the most useful of all those plants the roots of which are appropriated to the nourishment of man, being superior to the potatoe species. Its flavour is even more agreeable. It is tender and easily cooked, and is found to be so congenial to the stomach, that it is recommended as a food most fitly adapted both to the convalescent and those who digest other aliments with difficulty. This plant, which grows in the countries where the temperature rarely rises above 18 degrees of Reaumur, (60° of Fah.) has for some time past attracted the attention of horticulturalists, both in Europe and in the United States, and trials which have been made with it at Montpellier, Geneva, the horticultural establishment at Fromont, and elsewhere, hold out a prospect that this valuable vegetable may be introduced with success in the southern departments of France. [If so mild a temperature be congenial with its culture, what should prevent its becoming naturalized here?]

At Bogota, where the mean temperature is 18°, a light soil is selected for its cultivation. The roots are planted about fifteen or eigh-

teen inches apart, and when they appear above ground they are treated in the same manner as the potatoe, care being taken to nip off the flowers as they form, which plan is said to concentrate the vigour of the plant in the root, and to increase its bulk, which would not be the case without this precaution. In New Grenada they are six months in coming to perfection.

[*Rep. Pat. Inv.*

New Percussion Gun.

At the Royal Institution, last week, Mr. Farraday produced a new fowling piece, possessing a curious principle of percussion. This gun is the invention of Mr. Wilkinson, conjointly with Mr. Moser, who has obtained a patent for it. The principle consists in the introduction of the priming into the barrel, and firing it in that situation at the *top* of the powder. The priming being fixed in the wadding or shot cartridge, is struck by a fine steel pin, which passes through a sheath or tube, surrounded by the gunpowder; and the advantages are, that no operation of priming is required, that being done in the act of loading; there is no flash or smoke, it is perfectly water-proof, and not liable to miss fire; and the whole charge of powder must be ignited in consequence of being fired from the top, and exactly in the centre.

[*Mech. Mag.*

Extraordinary Rail-way Performances.

On the occasion of a scientific gentleman lately visiting the Liverpool and Manchester rail-way, some very extraordinary performances were effected. On two occasions, a load amounting to one hundred tons was drawn by one engine from Liverpool to Manchester, a distance of above thirty miles, in an hour and a half, being at the average rate of twenty miles an hour. An eight horse wagon on a common road, is capable of carrying only eight tons a day. Consequently, it would take one hundred horses working for one day on a turnpike road to perform the same work as was here accomplished by a single steam engine in an hour and a half on the rail-road. It is said that no further performance on the rail-road had come near this result.

[*Liverpool Paper.*

Experiments upon Milk.

M. Dirchoff, the Russian chemist, who sometime since discovered the process of converting starch into sugar, has lately made several experiments upon milk; the result which he has arrived at is curious. He is said to have found a mode of keeping milk for use for any indefinite space of time. The process of preserving is this—he causes new milk to be evaporated over a slow fire, until it is reduced to a dry powder. This powder is then put into a bottle hermetically sealed. When the milk is wanted for use, it is only necessary to dis-

solve some of the powder in a reasonable quantity of water, and the mixture so dissolved will have all the qualities as well as the taste of milk. [*Rep. Pat. Inv.*

¶ *Symington's Steam-Boat.*

Sir,—The drawing sent herewith represents the *Charlotte Dundas* steam-boat and her machinery, constructed by my father, the late William Symington, Civil engineer.

She was formed for the purpose of towing vessels on the Forth and Clyde canal, and afforded in 1803, satisfactory proofs of her capability by dragging two laden vessels, of seventy tons burthen each, nineteen and a half miles in six hours, against so strong a head wind that no other vessel could proceed that day in the same track.

The late Robert Fulton, the American Engineer, was on board the Charlotte Dundas, took sketches of her machinery, and received ready and explicit answers to the questions he thought proper to put. Several years afterwards his first boat appeared in America.

Prior to the Charlotte Dundas two exemplifications were afforded by my father of the practicability of the adaptation of the power of steam to the purposes of navigation: the first in 1788, on Dalswinton lake, the second in 1789, on the Forth and Clyde canal.

Two circumstances may be worthy of notice—first, the Charlotte Dundas, to prevent accidents, was steered at the stern; second, the idea of making steam subservient to navigation originated from witnessing the performance of a model for a steam carriage, which, in 1784, he had invented, and, in 1786, submitted to the inspection of eminent scientific and learned gentlemen in Edinburgh.

Should these facts be deemed interesting, their insertion in your widely circulated Magazine will oblige

Your most obedient servant,

W. Symington.

Bromley, Middlesex, Sept. 4, 1832.

Description of the Engraving.

a, cylinder. B, boiler. C, steam pipe. *d*, steam valves. E E, exhausting valves and eduction pipe. F, condenser. G, air pump. *h*, air pump lever. *i*, hand gear and pump rod. J, paddle wheel (1.) *k*, crank. L, starboard rudder (2.) M M, paddle wheel cavity (3) *n*, friction wheels. P P, piston and connecting rods (4.) T, arm and rod (5.) G, steer wheel. V V, flotation line.

[*Mech. Mag.*

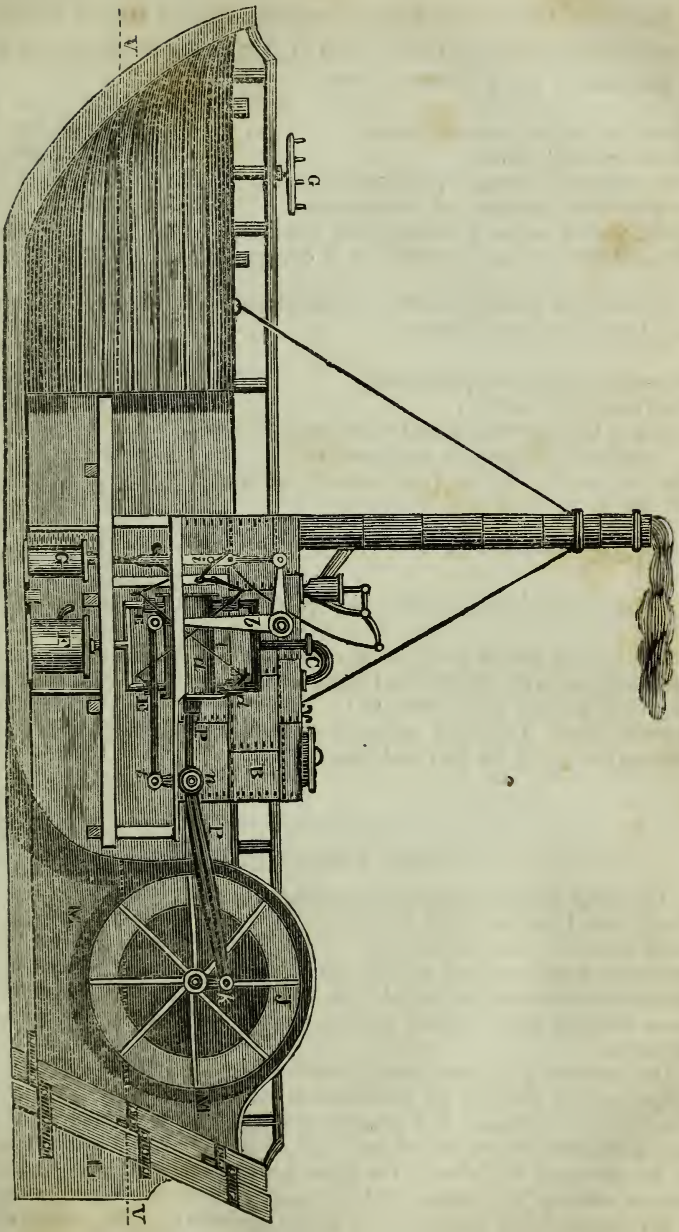
(1) Contained in the paddle wheel cavity.

(2) Connected to the larboard rudder by means of iron rods, and wrought in the fore part of the boat by a steer wheel in the centre of the stern of the vessel.

(3) Open behind and below to the water.

(4) Supported by the friction wheels.

(5) Communicating motion to lever.



¶ *Amount of the real or declared value of the different articles of Hardware exported from Great Britain to foreign countries, during the year ending 5th of January,* 1830.

	£	s	d.
Brass and copper manufactures,	810,641	2	0
Hardware and cutlery,	1,389,514	19	0
Iron and steel, wrought and unwrought,	1,155,176	15	0
Mathematical and optical instruments,	21,612	5	7
Plate, plated wares, jewellery, and watches,	177,242	1	0
Tin and pewter wares, exclusive of unwrought tin,	235,021	19	1

The exports of the same articles during the year ending 5th of January, 1820, were as follows—

	£	s	d.
Brass and copper manufactures,	653,859	13	5
Hardware and cutlery,	1,149,510	19	7
Iron and steel, wrought and unwrought, (mathematical instruments not specified,)	924,448	8	1
Tin and pewter wares, (exclusive of unwrought tin,)	187,811	10	7
Total,	2,915,630	11	8
Increase of the exports of 1829 over those of 1819,	873,578	10	0

The United States is by far the most important market for hardware and cutlery. Of the total value (£1,389,514) exported in 1829, they took no less than £669,871. The East Indies, West Indies, British North American colonies, and the United States, are the principal markets for iron and steel.

[*Mech. Mag.*

Armed Steam Vessels.

The large steam vessels which are now in progress of building in Sheerness, Chatham, and Woolwich dock-yards, are to carry two bomb cannons, mounted on pivots, so as to swivel and command an extensive range, without altering the course of the vessel. This will enable a steam vessel to be put in the best possible position, relatively to an enemy's armed vessel, so as to protect the paddle wheels free from shot.

One cannon is to be so situated on the after part of the deck as to range entirely over the arc of the stern, and as far forward as the paddle boxes will permit. The other is to be mounted before the wheels, and will command an arc on each side, from the bow to the forepart of the casing of the wheels; the latter prominence will, however, interrupt much of the service of this piece of ordnance. The calibre of the cannon is ten inches, and it weighs upwards of eighty-four cwt.

[*Ibid.*

New Diving Apparatus.

The Board of Admiralty lately sent down to Sheerness the invention of an ingenious apparatus, to make a trial of, under the inspection of Sir J. Beresford. The diver descends into the water by a ladder, where he can remain for a length of time, and can walk about the "ocean's oozy bed" with perfect safety, and even without feeling any suffocating sensation. The apparatus consists of a metal cap or covering for the head, with two tubes or hoses affixed to it; these lead to an air pump which is kept constantly at work during the descent. Two glasses are fitted in the cap, by which he is enabled to see any thing, and to pick up the smallest article. His dress, including the gloves, is a preparation of Indian rubber; so that he is not exposed to wet or cold; for upon removing the dress and cap, the diver appears perfectly dry and warm.

[*Rep. Pat. Inv.*

Ogle & Summers' New Steam Carriage.

A most satisfactory trial has lately been made of the powers of the steam carriage of these gentlemen. A large wagon was attached to their vehicle, containing a boiler for a ten horse steam engine, weighing, without the wagon, upwards of forty hundred weight. In the steam carriage were about twenty persons, and many on the boiler in the wagon. The roads were very heavy and wet; notwithstanding, so great was its power, that it proceeded with the greatest facility at upwards of ten miles an hour, crossing two bridges at Redbridge, about four miles from Southampton, of the following elevation, nine and three-eighths inches in ten feet! and deposited its immense load at Eling. The fore wheel of the carriage, (as is often the case with new wheels) became bound in the axle, which materially added to the friction, but the whole of the machinery was perfect. It is supposed, that if the full power of the engines were to be exerted, three times the weight could be drawn with equal facility, and greater rapidity.

This experiment is one of great importance, and calls on the proprietors of the newly projected rail-ways to pause before they proceed.

We understand that Messrs. Ogle and Summers made the trial to satisfy themselves, previously to their painting the vehicle, and proceeding through Oxford, Birmingham, Liverpool, and Newcastle-on-Tyne, to Edinburgh, that the power of their patent boiler was more than sufficient for the purpose of merely carrying twenty or thirty persons at fifteen miles an hour. We know, that in a less perfect carriage, they have cleared many miles at the rate of thirty an hour.

[*Ibid.*

Notice to Correspondents.

Mr. Scholfield's letter is received and will be inserted in the next number.

X's query will also have a place.

Will some of our correspondents undertake the review of the *Mechanics* of the *Library of Useful Knowledge, and Cabinet Cyclopedia?* They are less known than their merits deserve.

COM. PUB.

Meteorological Observations for November, 1832.

Moon.	Days.	Therm.		Barometer.		Dew point	Wind.		Water fallen in rain.	State of the weather, and Remarks.
		Sun-rise.	2 P.M.	Sun rise.	2 P.M.		Direction.	Force.		
				Inches	Inches.				Inches.	
	1	56°	56°	30.10	30.00	46	SW.	Moderate.		White frost—hazy—sun
	2	47	63	29.83	29.90	41	W. S.	do.		Hazy. [red.
	3	37	55	30.15	30.15	35	W.	do.		Clear—hazy.
	4	37	60	.05	.05	56	S.	do.	.40	Cloudy—rain in night.
	5	55	66	29.90	29.90	57	W.	do.		Flying cl'ds—cloudy: rain
	6	52	49	.80	.80	52	SE. E.	do.	.45	Rain—cloudy.
	7	43	54	.90	.90	48	NW.	do.		Cloudy day.
☺	8	36	41	30.00	30.00	32	N. NW.	do.		Cloudy day.
	9	31	42	29.90	29.90	26	W.	do.		Clear day.
	10	34	50	.74	.74	31	W.	Blustering.		Lightly cloudy—clear.
	11	36	55	.65	.65	42	SW.	Moderate.		Clear—hazy.
	12	39	54	.80	.80	50	ENE. S.	Calm.		Clear—hazy.
	13	38	56	.70	.70	38	W.	Moderate.		Clear—hazy.
☾	14	36	39	.70	.70	22	W.	Blustering.		Clear day.
	15	27	33	30.00	30.00	22	W.	do.		Clear day.
	16	21	40	.20	.20	20	NE. S.	Moderate.		Clear day.
	17	35	50	.20	.20	44	NNE. SE.	do.		Cloudy day.
	18	58	60	29.70	29.70	58	S.	do.		Rain—cloudy.
	19	50	55	.70	.70	65	SW.	do.		Cloudy—flying clouds.
	20	34	37	.60	.60	21	W.	Blustering.		Clear day.
	21	28	38	30.15	30.15	27	W.	Moderate.		Clear—cloudy.
⊗	22	34	36	.00	.00	40	N.	do.	1.05	Rainy day.
	23	34	42	29.60	29.60	33	W.	do.		Light clouds—cloudy.
	24	33	42	.70	.70	34	W.	do.		Cloudy—flying clouds.
	25	24	35	30.10	30.10	19	W.	do.		Clear day.
	26	32	52	.05	.05	38	S.	do.		Clear—hazy.
	27	49	56	29.80	29.80	45	SW.	do.		Cloudy—flying clouds.
	28	48	49	.80	.80	42	W.	do.		Lightly cloudy—do.
	29	32	53	.95	.95	36	W.	Calm.		Clear day.
☽	30	40	54	.90	.90	48	SE. SW.	do.		Cloudy day.
	Mean	38.53	49.07	29.89	29.89	38.9			1.90	

	Thermometer.	Barometer.
Maximum height during the month,	66. on 5th.	30.20 on 16th.
Minimum do. . .	21. on 16th.	29.60 on 20th. [23d.
Mean do. . .	43.80 . .	29.89

Dawes' Improvement in Canals

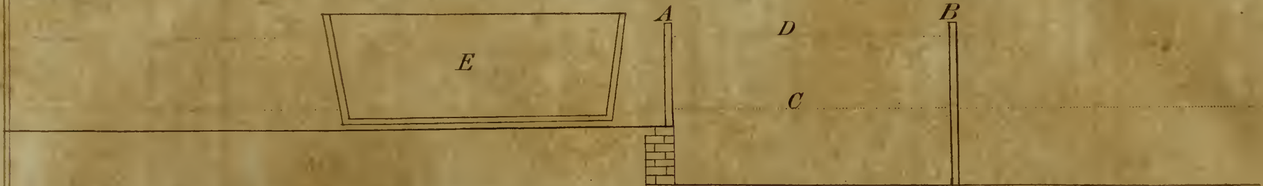


Fig. 1.

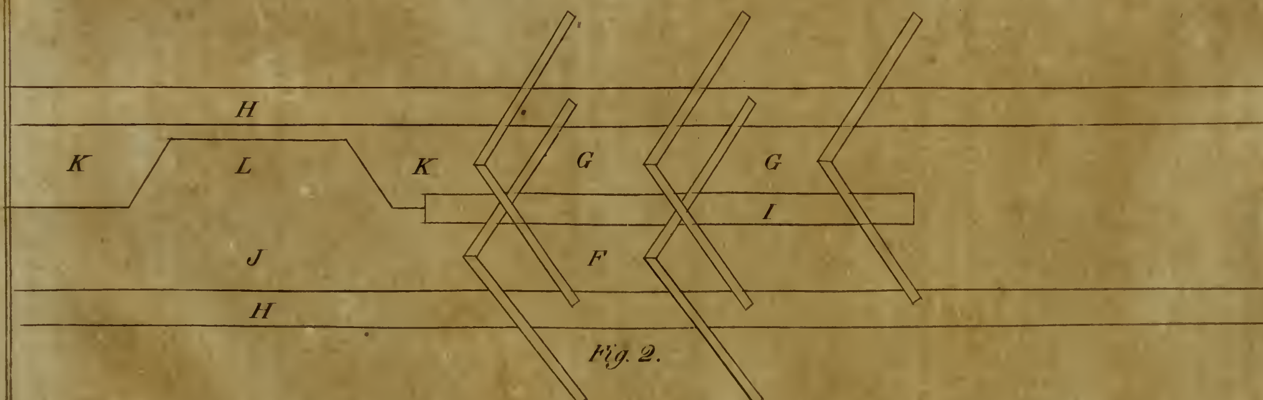


Fig. 2.

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

FEBRUARY, 1833.

Remarks on the improvements on Barker's Mill by James Whiteland, with a suggestion for increasing the efficacy of the original form of the Mill.

TO THE COMMITTEE ON PUBLICATIONS.

Montville, New London county, Con., Dec. 1, 1832.

GENTLEMEN,—In the second number of the tenth volume of the Journal of the Franklin Institute, there is a communication entitled "Suggested Improvements in the Construction of Barker's Mill, by James Whiteland," upon which I beg leave to offer a few remarks.

The principal improvement there proposed, consists in giving the arms which deliver the water, a curved form, the curve being such that the water will run from the centre to the extremity of the arms in a straight line, when the machine is at work.

By this arrangement, says the author, no centrifugal force is communicated to the water, as it has not received any rotary motion from the arms, which would have been given had the arms been straight.

Mr. Whiteland, after describing his modification of Barker's mill, goes on to make several deductions in relation to power, and to the advantages which this form possesses; these conclusions I shall endeavour to show are erroneous, as well in a theoretical, as in a practical point of view.

In the first place, suppose the orifices in the extremity of the arms, or jet holes, to be of the same area as the passage through the arms in all their parts, in order that the water shall pass with a uniform ve-

locity in its whole course through the arms as proposed by Mr. Whiteland, then the principle of action, as well as the form of Barker's mill, is altered; for in that mill the motion is generated at the orifices or jet holes, where the water leaves the arms, and is communicated to the mill by a proper reaction; whereas, in the proposed form, the motion is generated from the centre, as the water enters the arms, and in a direct line from the centre; the mill being put in motion only by the action of the water in endeavouring to pursue a straight course, in the direction first impressed, through the arms which are curved. Now the force which the water thus exerts to put the mill in motion is much less than in the original form of the mill; for the whole force of the column is at first spent in projecting the water into the arms producing a reaction from the arms towards the centre, which has no power to put the mill in motion; and next, the impressed force remaining in the water, it moves through the arms, and in consequence of their curved form, its action, in passing through them, puts the mill in motion, the action of the water being so oblique that a small portion only of the power is communicated to the mill. It is evident that the mill moves only with a power proportional to the square of the difference between the velocity due to the height of the water in the mill, and the velocity with which it actually passes through the arms, minus, the friction in passing through them; for as action and reaction are equal, every action of the water on the curve of the arms produces a corresponding reaction or retardation of the water.

The author is, I think, mistaken in supposing that the water will pass from the centre to the extremity of the arms in a direct line when the mill is loaded, let the arms have what form they may; it can scarcely approach to such a motion when the mill is without a load, for the water in leaving the upright trunk is forced in a rectilinear direction into the arms, and if the motion of the mill is such that the water pursues the direction in which it is first projected, its exertion to propel the mill, or to continue its motion, will be nothing.

Mr. W. says that the weight which would stop the mill must be equal to the weight of a column of water twice the height of the water in the mill, and having a base equal to the sum of the areas of the jet holes. But I shall proceed to show that the weight required to stop it, minus the friction of the water in passing through, and also the friction of the mill, would be to a column of water half the height of the water in the mill, on the base before stated, as the portion of the circumference bf, (see figure p. 74, vol. x.) is to half the circumference, or a semicircle, until the portion bf is equal to a semicircle, beyond which this proportion will not hold. For any nonelastic substance, such as water, communicates only half its motion by percussion or contact; and water passing in a curve by any force does not wholly lose or impart its force until its direction is reversed, which is the case when it has passed through a curve equal to a semicircle.

If the area of the jet holes is smaller than a section of the arms, the circumstances will be measureably altered. Suppose them to be

equal to half the area of the openings through the arms, then the water passes through the arms with half the velocity that it issues through the jet holes; here reaction takes place, as the water issues from the jet holes with an increased velocity, but only in proportion to the whole power, as the square, of the difference of the velocity in the holes and arms, is to the square of the velocity due to the height of the water in the mill.

I have thought fit to make the foregoing observations and statements, without entering into a detailed explanation of my views, wishing to be as brief as possible, and presuming that those acquainted with the subject will readily understand and acknowledge my position, and that Mr. Whiteland, by reviewing the subject, may be led to acknowledge that his conclusions were incorrect, if what I have stated is true.

I now suggest what in my view would be an improvement in the application of Barker's mill. It is known that a considerable part of the power remains in the water after it has left the mill, especially when loaded; as the velocity of the mill is necessarily much less than that of the water through the jet holes. This plan I actually put in operation a few months since on a small scale: I placed a common tub wheel immediately under the mill, on the same shaft with it, so that the water as it left the mill would strike the wheel which moved in one direction, while the mill, which was made to revolve on the shaft, moved the other way; thus I used the same water twice, by reaction and by direct action. Instead of using one upright trunk, around the shaft, I used two, placed a little distance from the shaft, and opposite to each other, which were fastened or connected together, and had a water course on the top. Above this course was a drum which was made to move on the shaft by bearings, without moving the shaft with it. The tub wheel was connected with the shaft, and moved along with it, and a drum on the same shaft immediately above this, connected with the mill. By this arrangement, one part of the wheel, with its drum, would move one way, and the other part with the drum with which it was connected, moved the other way, and by belting from these two drums to a horizontal drum, and crossing the belt in a particular manner, the horizontal shaft and drum would be moved in a single direction from the combined force of these two opposite motions. As the motion of this wheel decreases by increasing its burden, its power is increased by a stronger reaction on the mill, and by a stronger action on the wheel.

Yours, with respect,

Nathan Scholfield.

Report of a Committee of the American Philosophical Society, of Philadelphia, on certain Maritime Observations, made and submitted to the Society by Capt. CHARLES DIXEY.

TO THE COMMITTEE ON PUBLICATIONS OF THE FRANKLIN INSTITUTE.

GENTLEMEN,—The following extract of a letter of Capt. Charles Dixey, of Philadelphia, and the report in relation to it, are handed for publication, by permission of the Society to whom the letter and report were addressed.

Very respectfully yours,
A. D. BACHE.

Extract of a letter from Capt. CHARLES DIXEY *to* ROBERTS VAUX, *Esq., dated*

Philadelphia, May 15th, 1832.

"On my late passage from Liverpool, on the 25th of April, in lat. 44° N. long. 43° W. I passed near a very large island of ice; the temperature of the air at the time was 56°, of the water 58°. After this, for several days, the temperature of the air and the water declined until both fell to the freezing point. Winds variable from SW. to WNW. with very thick weather, so much so that we were not able to see beyond the length of the ship ahead, and determined to lie by, considering it the height of imprudence to run. The moderate temperature of the air and water at the time of seeing the ice, and the fact that no ice was to be seen when both water and air had fallen in temperature to 32°, are noticed from a knowledge that many navigators rely on the thermometer to indicate their approach to ice, to the exclusion of all other circumstances; and with a view to caution them against trusting to that instrument when sailing eastward from the Grand Bank in thick weather, during the season of ice-bergs."

Report on the foregoing observations.

The Committee to whom was referred a letter from Capt. Charles Dixey, to Roberts Vaux, Esq. read before the American Philosophical Society, on the 17th of August, 1832, submit the following report.

The subject on which the observations of Capt. Dixey were made, is one which has, at different times, occupied much of the attention of this society. The first remarks in relation to it are contained in Dr. Franklin's paper of "Maritime Observations," published in the second volume of the society's transactions. Dr. Franklin established by observations made in three passages across the Atlantic, included between lat. 33° 17′ N. and lat. 49° 15′ N. that the water of the Gulf Stream, is always warmer than the sea on each side of it, and recommended to navigators the use of the thermometer to indicate this, and other currents, from warmer to colder seas.

In the third volume of the Transactions of this Society are the observations of Mr. Jonathan Williams, (afterwards Col. Williams of

the Engineers,) made in 1789 and 90, on the temperature of the air and water in different parts of the Atlantic ocean, between the latitudes of 36° 30′ and 50° 24′ N. The conclusion which Mr. Williams draws from his observations, and which they most fully warrant, is that the effect of shoals is to lower the temperature of the water over them. Thus in passing over the Banks of Newfoundland in the month of July, the thermometer which had given 64°, 63° and 62° Fah. for the temperature of the ocean, fell to 47° Fah. Mr. Williams points out the difference in the effects produced by large and small banks, in depressing the temperature of the water over them, and also the effect of their situation, &c. He confirms the observations of Franklin, and urges upon the navigators of the Atlantic the use of the thermometer for the double purpose of detecting the presence of the Gulf Stream, and their approach to soundings. In passing, he remarks that the same instrument may serve to indicate nearness to masses of ice.

This subject was resumed by Wm. Strickland, (now Sir William Strickland,) of York, England, who presented to the society in 1798 (Trans. Am. Philos. Soc. vol. v.) the results of very minute observations made during a passage from Hull to New York, in July and August, 1794, and from Philadelphia to Falmouth, England, in the same months of the following year He confirms the results of Mr. Williams, and adds a new fact, namely, that a branch of the Gulf Stream extends as far as lat 47° N. long. 39° W.: this branch appears to have been crossed by him, both in his voyage to this country and on his return to England.

In the American edition of the Domestic Encyclopedia, the editor gives (article Thermometer,) an account of an observed depression of the temperature of sea water, when within five or six miles of several islands of ice: the observation was communicated to him by Mr. Joseph Donath, of Philadelphia.

Frequent observations of Capt. Parry, are in accordance with the one just referred to. It is not, however, to be expected that under all circumstances, the thermometer will indicate the neighbourhood of a mass of ice by a sudden fall. If, even, the influence of the mass were sufficient to extend to a distance, the effect might be neutralized by the presence of a warm current, and the current, though actually cooled, might not appear so in relation to the water near it. The observation of Captain Dixey is of consequence, as showing that in particular situations such may be, and is, the case, and that an attentive study of the observations already made is necessary, in order that the thermometer may be used to the greatest advantage: his remark on the impropriety of relying upon the indications of the thermometer, without considering all the circumstances of the case, will come with weight, supported as it is by the results of his experiment.

As far as the observations of Capt. Dixey have been reported, they confirm those of Messrs. Williams and Strickland. In the month of July Mr. Williams found the temperature of the ocean, in nearly the same lat. and long. referred to by Capt. Dixey, 63° Fah. The temperature of the water diminished to 47° in passing the Great Bank.

In April, when the effect of the winter's cold was beginning to diminish, Capt. Dixey found the temperature of the water 58° in long. 43° W. lat. 44° N. To the westward of this, a diminution of temperature was shown by Mr. Williams' observations, and occurred in Capt. Dixey's.

From a rise of the temperature of the water between the longitudes of 36° and 45½° W. and latitudes 47½° and 45½° N. Mr. Strickland inferred that he was crossing a branch of the Gulf Stream, and the probability was strengthened, on his return voyage, by an observation of the same rise from about long. 43° to 34½° W., and lat. 44° to 46° N. Capt. Dixey ought therefore to have noticed a rise of temperature in lat. 44° N. long. 43° W. supposing the circumstances noticed by Mr. Strickland to prevail throughout the year; and that he did not find this to be the case seems to show, that the ice had produced an effect on the temperature of the current, in this part of the ocean.

The committee present an extract from the letter of Capt Dixey, which they would recommend to the society to have published. By the example of one so experienced in his profession, navigators may be induced to examine what has already been contributed by observers, and to extend the observations so that in the various latitudes and longitudes traversed by the vessels between the United States and Europe, the temperature may be perfectly known, and the effects of a proximity to the different coasts, and to particular banks accurately determined, for all seasons of the year. Observations made in other parts of the ocean would serve to show what differences exist in the effect of banks, &c, and might, by leading to a correct understanding of the causes of the phenomena, prove of service by enabling us actually to anticipate observation.

(Signed,)

Charles Pickering,
Jas. Mease,
A. D. Bache.

Report on the question, "Are there any trades so injurious to health, or so hazardous to morals, that they ought, for that reason, to be discouraged, or abandoned?" By the Editor.

A Lyceum upon the same general plan with those established in various parts of the country, and particularly to the eastward, has been in operation in the city of Washington for about a year past. When questions are accepted for discussion, it is the practice of the Lyceum to refer them to some member for his report thereon. This may account for the desultory manner in which the subject is treated, as such reports are not intended to be elaborate productions, but

are merely designed to pave the way to a free and full discussion; an end which they have been found well calculated to promote.

To the Washington city Lyceum, the following Report on the question, "Are there any trades so injurious to health, or so hazardous to morals, that they ought, for that reason, to be discouraged, or abandoned?" is respectfully submitted.

When a question of the above description is propounded to an individual whose mind has not been schooled by habits of reflection, and there is presented to his notice some occupation, or trade, which is obviously injurious to health, or hazardous to morals, he will probably pronounce, at once, that it ought to be abolished by the interposition of the law. The philosopher and the moralist, however, who are in the habit not only of inquiring into the immediate relationships of every subject, but of tracing each to its remote affinities, will in most cases see cause to reverse this judgment. The question before us, will, I apprehend, be found, in most of its bearings, to be one of a very complex character. This must be apparent, when it is recollected that the perfection of those arts from which civilized man derives so many of his highest intellectual and corporeal enjoyments, are dependent upon pursuits which form very remote links in the chain of events upon which civilization itself is dependent; events, however, so intimately catinated, that we may with much reason apply to them the idea of the poet, that if the connexion is destroyed,

> "Whichever link you strike,
> Tenth, or ten-thousandth, breaks the chain alike."

The question, as propounded, is so latitudinarian in its terms, as to render it impossible, in the compass of such a report as ought to be delivered to the Lyceum, to present it in many of its bearings. I shall, consequently, be compelled to assign to it limits of my own choosing; although in so doing, I may be charged with acting something like the Grecian who, having a house for sale, exhibited a single brick as a sample of its elegance and convenience.

The proportion of those trades and occupations which are unfavourable to health, or hazardous to morals, is very large, when compared with the whole catalogue of those pursued by man. Some of these are intrinsically hurtful in both respects, whilst others are rendered so, principally, or entirely, by the manner in which they are carried on, and the habits of those engaged in them. It seems necessary, however, to confine our inquiry to such as are intrinsically hurtful, as in the others, it is the habits which are to be condemned, and all will admit that these, when bad, ought to be discouraged, and abandoned.

I have already remarked that the terms of the question are somewhat vague. I allude particularly to the words "discouraged or abandoned." If regulation, or suppression, is intended, this will re-

fer the action to the legislative and executive authorities, and in this way I consider it as necessary to treat it; for if such things are to be attempted by individual exertions, the whole business of the world must merge in the formation of a thousand different societies, analogous in their organization and objects with that of the Temperance Society.

The business of the miner is, in numerous instances, extremely unfavourable to health, and that necessarily so; in proof of this position we will take an example from the mines of a common metal, lead, in a place chosen at random, where there is nothing to render the business particularly hurtful. In a work written within a year or two, it is observed by its author, Mr. Thackrah, that at the small village of Arkendale, situated in a mining district in Yorkshire, England, there were then not fewer than thirty widows under thirty years of age, whose husbands had died of diseases of the lungs, and other affections, brought on by the dampness of the mines, and the other hurtful circumstances attendant on the business in which they were engaged. Where there is so much early destruction of life, we must necessarily conclude that a large proportion of those whose constitutions enable them to resist the fatal effects of their business for a longer period, must drag out existence in a state of extreme suffering. The picture of the suffering in these mines, however, would lose its colouring along side those which might be drawn of that endured in the mines of quicksilver in Idria, of arsenic and cobalt in Germany, and of many, very many others in different countries. Were I to describe them, I must place before you such scenes of human suffering as it would be extremely painful to narrate and to hear; I forbear therefore to bring them forward, not deeming them necessary to the sustaining of the position which it is my design to advocate.

Shall we pass laws for the purpose of preserving the health, and of saving the lives of those now employed in these mines? If so, we must ordain that they shall be closed up, and that the metals which they produce shall be no more used in the arts. Let us suppose that quicksilver, one among the worst, was selected, and that the use of that metal alone was inhibited. What would then become of those mines of gold from which the precious metal cannot be obtained in any other way than by its amalgamation with mercury? All the arts which are dependent on the use of this metal, must be relinquished, and of these there are several of no small importance, and the relinquishment of which would involve very serious considerations. It may be doubted whether the ladies themselves, humane as they are, would even consent to forego the employment of those ornamental and useful mirrors by which their charms are so often and so faithfully reflected. Admitting, however, that this sacrifice was made, and for the looking glass we had substituted plates of polished metal, or in default of these, the mirror of Narcissus, there would still remain unfulfilled the most important purpose to which quicksilver is now applied. Because thousands perish in the working of these mines, shall we, to

save these, indirectly slay our tens of thousands, by depriving the physician of the use of that Sampson of medicine, mercury? A remedy, without which, his efforts to cure some of the most formidable diseases, would be altogether unavailing. Were I to pursue this part of our subject to its limits, I believe that, standing alone, it would suffice to convince any one of the utter futility of the attempt to legislate respecting, or in any other way to regulate, the pursuit of such a business as even that of digging for quicksilver.

Leaving one of the worst, we will inquire for a few minutes into some of the consequences resulting from our obtaining from the earth those substances which are among the most harmless, and the most useful productions of the mineral kingdom. Were we to visit the coal districts of England, we should find them abounding with widows and orphans, whose husbands and fathers have been blown to atoms, or scorched to death, by the explosions of the fire damps, a hundred at a time; or who have been killed by the choak damp, or drowned in the waters which sometimes make an irruption into these mines. We should, also, every where, meet the lame, and the halt, and the blind, who have merely escaped from a sudden death to drag out a miserable existence in pain, poverty, and want of every description. Shall we apply a remedy to these evils, and provide that, in the coal mines, there shall be no more accidents from carburetted hydrogen, carbonic acid, water, the falling in of roofs, or the giving way of ropes, chains, and ladders? But how shall we accomplish this? Why certainly in one way only; we must resolve to do without the coals; we must close the smelting furnaces of a nation; arrest every branch of manufacture, and at length put a final end to human misery, by allowing, in the first winter, the poor and the rich to freeze to death in one common mass, from the want of the only fuel which the country can supply.

The universal suffrage, I apprehend, would be against such a measure; at all events, when the toes and the fingers of those whose sublimated, sentimental humanity had caused them to hesitate, were becoming frost-bitten, they would send in their adhesion, and admit that it would be best to let the colliers pursue their labours, and run their inevitable risks.

Leaving the miners, therefore, to those diseases and accidents to which their occupations necessarily subject them, because, for the purpose of continuing the blessings of civilization itself, we must obtain the metallic treasures of the earth, and the coal which is necessary to smelt them, let us make some inquiry into the effects of certain manufactures of the metals, after they have been brought into their reguline state; in doing this, that one shall be chosen which does not possess any poisonous property, but which, in nearly all its combinations, is calculated to give tone to the animal system, whilst it, at the same time, forms the basis upon which the whole superstructure of the fine and useful arts is directly, or indirectly, sustained. This metal, you are all aware, is iron.

Without offering any great act of violence to the subject, we might, in speaking of this metal, introduce an inquiry into the remote effects

of certain arts and trades; not upon the individuals who are the manufacturers of particular instruments, but upon those for, or against, whom, such are to be employed. The making of great, and of small guns, of pistols, of swords, in all their numerous varieties, of pikes, dirks, &c. &c. has, it is true, no remarkably injurious effect upon the persons who are thus employed, but, after they leave their hands, what myriads of the human race are cut off by them, whilst in the full possession of health, and in the prime of life. To such an inquiry, I am aware that it might be replied that nations and individuals will fight, and destroy each other, and that if deprived of the present more elegant means of doing so, they would still satisfy the noble calls of patriotism, the lust for spoil, and the promptings of ambition, by returning to the use of the sling, the bow, the war club, and the other rude modes adopted by our remote ancestors, and still pursued by impolite communities. Admitting this as an answer, it is much to be apprehended that one of a similar character, and equal in force, might be urged against any scheme, the object of which is to prohibit any trade or calling for the sake of those directly employed in it, as it would be necessary in this case to pursue the effects of the prohibition in its indirect as well as its direct bearings.

Leaving these naughty guns and swords to perform their respective offices, in the hands of those who are commissioned to "burn, sink, and destroy," allow me to direct your attention to those little spears which are never supposed to thirst for life, but whose worst acts are, to occasionally puncture a lady's finger, and to stain a cambric handkerchief. If we examine into the circumstance attending the production of that very harmless article, we shall find that between the period when the steel of which it is made was formed into wire, and that in which, as a finished needle, it is ready to be nimbly plied by the fair hand of industry and beauty, it has committed the most appaling ravages.

We have here taken a manufacture of very great extent, and giving employment to many thousand workmen. Of the persons engaged in the pointing of needles, very few indeed reach the age of forty years, by far the greater number dying under that of thirty-two. The fine particles of steel which are ground off, are so light as to float in the air, and are so copiously deposited upon the mouth and nostrils as completely to blacken them; much irritation is produced by them in the lining membrane of the nose, and at first a copious, mucous discharge is produced from it; but afterwards, the irritability of the parts is exhausted, and they become perfectly dry. The trachea, or wind-pipe, is next affected; respiration becomes difficult, and an habitual, exhausting cough is produced. Soon, nearly all the animal functions are disturbed, the digestive organs refuse to perform their offices, and the lungs, in particular, become the main seat of that total derangement of the whole system which must soon terminate in death. To find a man who has followed this trade for twenty years, is almost impossible.

I have introduced the pointing of needles as an example of the de-

leterious effects of the fine dust of steel, but the like evils are experienced in the making of a great number of other instruments of iron as well as of steel. Forks, for example, are finished by what is called dry grinding; that is, by grinding them upon a stone without water. Numerous utensils, also, of cast iron, when finished on the dry stone, or by fine files, give out a dust producing all the effects which I have described, and in an equal degree. To put a youth to these businesses, therefore, is to bespeak for him an early grave; yet society wants, and must have the articles, and there is no more difficulty in inducing men to follow these trades than there is in enlisting them for the purpose of being killed, *secundum artem*, in the army or the navy; especially if they are to receive a few pence per diem more for this, than for some other species of labour.

Humanity has asked the question, is there no means of preventing, or lessening this evil? and ingenuity has devised a method of accomplishing the object, which it was believed would be effectual. A Mr. Abraham invented what was called a magnetic mouth piece, to be used by the needle pointers, and dry grinders. This consisted of a considerable number of small magnets connected together by a common frame. The magnets were placed within a small distance of each other, and formed a kind of lattice work; when these were strapped upon the face, the air which entered the mouth and nostrils must pass between them, and the ferruginous particles would consequently be attracted by, and adhere to the magnets. As might have been foretold, however, without the gift of prophecy, those for whose use they were intended would not wear them. Several causes combined to prevent their doing so, either of which would have been sufficient to govern the conduct of persons such as we are speaking of; these magnets were costly, and as they must frequently be taken off to be cleaned, they were very troublesome; but, worse than this, they were very ugly, and, worst of all, they excited the laugh, and the jeers of the shopmates of those who wore them. If the philosopher can scarcely scorn the world's dread laugh, he must know but little indeed of human nature who would expect better from the class of men who grind forks and point needles.

I might go on and write a volume without danger of exhausting this subject; but I am not aware that there could be found more apt illustrations than those derived from some of the most necessary trades, most extensively pursued, and most destructive of the health and lives of those by whom they are pursued. In a despotic government, where human life is held cheap, a tyrant may compel an individual to wear an iron mask, without offering a reason why, but in a free government, where the life of every citizen ought to be accounted of inestimable value, the only mode of inducing a man to wear one for his own benefit, as well as to do many other desirable and proper things, is to give to him that degree of education which shall elevate him in his own opinion, and induce him to act from motives more worthy his intellectual nature than those which usually govern persons in walks of life accounted much more exalted than that of the great body of workmen in our manufactories: this is the only reme-

dy upon which I can found any hope; but, were I standing upon the threshold of life, just about to enter upon its duties, and possessing in the commencement of my career the benefit of the few observations which I have made, the little truth I have gleaned in the years which I have numbered, I should even then consider the hope as utopian that I should live to witness the dawn of such a state of things in the humbler walks of life; for, warmly as I now feel in favour of a system of universal education, and great as I believe the benefits which are to be derived from it, I do not entertain a hope that by any effort, merely human, the great body of any community can be so far elevated above the level at which they now stand, as to induce them to act the philosopher in cases of this description. At all events I am fully of opinion that so far as governments are concerned in the regulation of trades and callings, they ought to be, as they generally have been, confined in their action to the prevention of nuisances; that artisans and manufacturers should be allowed to pursue their own business in their own way; and that "Laninez nous faire," should be their motto.

All which is respectfully submitted.

THOS. P. JONES.

Query in relation to the best form of a Lever Beam for a Steam Engine.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—By inserting the following query you will oblige one of your subscribers.

What should be the form of a cast iron lever-beam of a steam engine, so as to afford the greatest strength, with a given weight of material.

Yours, &c.

X.

FRANKLIN INSTITUTE.

Annual Meeting.

The thirty-sixth quarterly, or ninth annual meeting of the Institute was held at their Hall on Thursday, January 17, 1833.

CHARLES C. HAVEN was appointed Chairman.

GEORGE MERRICK, Secretary, Pro. Tem.

The minutes of the last quarterly meeting, and also the minutes of the meeting held this day at 3 o'clock, to appoint the tellers, and open the poll for the election of the officers and managers of the Institute for the ensuing year, were read and approved.

The ninth annual report of the Board of Managers was read, and,

on motion, referred to the committee on publications with instructions to publish it.

The annual report of the Treasurer was also read and accepted.

A number of donations to the Institute were laid on the table, having been received from Mr. M. V. De Moleon, of Paris, France, from Messrs. Judah Dobson, Matthew Carey, and Peter A. Browne, and from the Academy of Natural Sciences.

Professor A. D. Bache, with a view to carry into effect that part of the report of the Board of Managers, relating to the monthly meetings, offered the following resolution:—

Resolved, that the fourth Thursday evening of every month, be devoted to meetings for conversation on subjects immediately connected with the objects of this Institute, in lieu of the formal meetings heretofore held on those evenings,—which was unanimously agreed to.

Mr. S. J. Robbins, on behalf of the tellers of the election, made their report to the chairman, who declared the following gentlemen to be duly elected officers and managers for the ensuing year.

James Ronaldson, President.

Isaiah Lukens, Thomas Fletcher, } Vice Presidents.

William S. Perot, Recording Secretary.

Isaac Hays, M. D., Corresponding Secretary.

Frederick Fraley, Treasurer.

Managers.

Samuel V. Merrick
Abraham Miller
William H. Keating
Isaac B. Garrigues
Rufus Tyler
John Struthers
Matthias W. Baldwin
Samuel J. Robbins
Mordecai D. Lewis
Charles H. White
Thomas Scattergood
Benjamin Reeves

Alex. Dallas Bache
James H. Bulkley
Alexander Ferguson
Joshua G. Harker
John Agnew
George W. Tryon
John Wiegand
William B. Reed
Benjamin Say
George Fox
Alexander M'Clurg
John M. Ogden

On motion, adjourned.

C. C. Haven, *Chairman.*

Geo. Merrick, *Rec. Sec. P. T*

Minutes of the Board of Managers.

At a meeting of the Board of Managers of the Franklin Institute, held at the Hall of the Institute on Thursday, the 24th of January,

Professor Alex. Dallas Bache was elected Chairman of the Board for the ensuing year, and

Messrs Saml. J. Robbins and Alex. Ferguson, Curators.

And at a meeting of the Board held on Thursday the 31st January, the Chairman nominated the Standing Committees agreeably to the by-laws. On motion, Professor A. D. Bache was added to the committees on Inventions and on Publications; Mr. C. Gobrecht to the Committee on Inventions; Mr. Jacob Pearce to the Committee on Minerals; when the Committees were appointed as follows:—

1. *On the Library.*

M. D. Lewis
Isaac Hays, M. D.
W. B. Reed
W. S. Perot

2. *On Cabinet of Models.*

John Agnew
Rufus Tyler
Charles H. White
John Struthers
John M. Ogden

3. *On Cabinet of Minerals.*

Isaiah Lukens
Benjamin Say
Abrm. Miller
Thomas Scattergood
George W. Tryon
Jacob Pearce

4. *On Publications.*

A. D. Bache
Isaac Hays, M. D.
Samuel V. Merrick
M. W. Baldwin

5. *On Inventions.*

Samuel V. Merrick
Benj. Reeves
A. D. Bache
Isaiah Lukens
James Ronaldson
M. W. Baldwin
Rufus Tyler
W. H. Keating
John Wiegand
John Agnew
Benjamin Say
Alexander M'Clurg
Christian Gobrecht

6. *On Premiums and Exhibitions.*

Samuel J. Robbins
W. H. Keating
Frederick Fraley
M. W. Baldwin
Joshua G. Harker
Isaiah Lukens
Alexander Ferguson
J. Henry Bulkley
Alexander M'Clurg

7. *On Instruction.*

Frederick Fraley
Charles H. White
Samuel J. Robbins
John Wiegand
Wm. B. Reed
George Fox

8. *Managers of the Sinking Fund.*

Samuel V. Merrick
Alexander Ferguson
Frederick Fraley

9. *Auditors.*

Isaac B. Garrigues
Joshua G. Harker

Annual Report of the Board of Managers.

To the Franklin Institute of the state of Pennsylvania for the promotion of the mechanic arts, the Board of Managers respectfully submit their Ninth Annual Report.

The year just passed has been one of considerable change in the general arrangements of the Institution, and although the details have been given to the members in the progress of the year, by the quarterly reports of the Board of Managers, a general statement of the present condition of the different branches of the institution cannot be unacceptable to the Institute.

The division of the duties of instruction, as communicated by lectures, has been during the present course the same as during the last; and the same portion of time has been devoted to each branch. The regret which the Institute felt in the resignation of Professor Franklin Bache has required the efforts of his efficient successor to efface. It is due to the present professor, Dr. J. K. Mitchell, to state the high sense which the Board entertain of his liberal and successful exertions, but the attention with which a numerous class receives his instruction, must be a more gratifying evidence of success, than can be afforded by this expression of opinion, however favourable. In making the experiment of a division in the course of natural philosophy, the Board believed that they were promoting the best interests of the Institution, and that the efforts for which they called upon the members, in order to second their project, would be afforded with alacrity. The various branches of physics, with all their useful applications, could not be fairly presented in a course limited to a certain number of lectures, and embracing the whole range of natural philosophy, and a natural line of demarcation exists between a course on machines, and on general physics which could hardly fail to be seized by the lecturers, interested in giving efficiency to their courses. A subscription was made, by individual members of the Institute, to effect the purchase of the apparatus necessary to illustrate the course of practical mechanics, and the amount subscribed has been faithfully appropriated: the Board return thanks for the liberality thus manifested, while they must express a deep regret, that from the small number of contributors to this object, hardly a beginning could be made of the collection designated by the lecturer. A list of the subscribers is herewith presented. For this deficiency of apparatus the

lecturer has made every exertion to compensate. The combined courses have certainly added to the interest and usefulness of this department, and if all is not yet accomplished that was expected, the experiment has been sufficient to show the soundness of the views in which it originated.

There have been issued this year, besides the tickets to members, 170 minor's tickets, 68 ladies' tickets, and five stranger's tickets.

The new division of the Hall of the Institute, which has resulted from the surrender of the third floor by Prof. Johnson, has been of great importance to the schools of the Institute, and it may be safely affirmed that their situation is now more favourable than at any previous time. The drawing school is now held in the room originally intended to be occupied by it, the western room of the third floor: this location gives it no inconsiderable advantage, and by increasing the respectability of its arrangements, will no doubt add to the patronage which it now receives. This school has been, as during the last year, entirely under the control of Mr. Geo. Strickland, no appointment of a teacher of ornamental drawing having been made. The number of pupils who have received tickets has been twenty-three; of these twenty-one are minors; and have the privilege of attending the lectures of the institution without additional charge. The division of the third floor has also enabled the connexion between the English school and the institution to be made more close; this school occupies the eastern room on that floor. The thorough system pursued by Mr. Seth Smith, the principal of the school, has not failed to make the due impression upon the minds of the members of the Institute and upon the public, and the school bids fair to meet the wishes of its friends. In relation to the system of this school the committee on instruction have renewed their favourable report. Three of the scholars of last year, who were reported as having been particularly assiduous, received honorary tickets of admission to a course of lectures in the Institute.

The plan by which the contributions to practical science are made by the Franklin Institute, is now well understood, and the Board present a statement of the progress made by the different committees during the year.

The labours of the committee on inventions, ranking high in importance, claim the first attention, as from their nature they are least understood, without the circle of those who have occasion to feel their benefits. This committee have made but three reports through the Journal of the Institute during the past year, and the inference is natural that as, in this age of invention, they must have had more opportunities than these of expressing their opinion, that they have been inactive. But this inference is founded in a misapprehension of their duties. The committee are to serve as counsellors to inventors, not always as reporters. An invention is submitted, and in a personal interview, or by letter, explained by the inventor; it is freely discussed; its novelty and its merits examined. In perhaps a majority of cases, the inventor is satisfied, from the views given him, not to present the invention to the public; in others, the inventor requests

a written report, which he receives, and is often unwilling that it should come before the public, from whom he withdraws the invention. In the small number of cases then, in which an inventor desires the publication of a report, or in which he has brought his invention so far before the public that he cannot retract it, do the reports of this committee appear in print, as records of the time which they devote to their duties.

The committee on publications have devoted, during the past year, to the Journal more attention than could, in reason, be required by the Institute, and the fruit of it has appeared in its pages. Our highly valued editor, Dr. Jones, has not intermitted his labour, and the record of American patents is brought in the December number of the Journal to the month of June of this year, remarks being made by the editor upon nearly every patent, and the specifications of many being given entire.

The committee on the library and reading room have not neglected this interesting branch of the association. Newspapers from almost every state in the Union, the principal journals of our own country, the journals devoted to mechanical science in Great Britain and France, are regularly received, and to be found upon the tables of the reading room. In conjunction with the curators, this committee have greatly improved the accommodation of the room; the models have been removed, and the entire room is now appropriated to the use of readers. An equivalent for the legacy of the late Mr. Warder has been received during the year, and has been invested in books, according to the intention of the testator.

Under the direction of the committee on models, the models of the Institute, and the machinery deposited, have been transferred to the new room on the third floor. This room will be entirely devoted to the reception of models, machinery, &c., and here the Board hope may be made a beginning of the collection of materials, used in the arts, so earnestly spoken of in the last annual report. Machinists will here find a safe and convenient place of deposit, for articles serving as specimens of their work, and the members of the Institute will be gratified and improved by the examination of the various deposits.

The committee on the cabinet of minerals have been occupied in cleaning and arranging the specimens.

The members have already been made acquainted with the causes which led to the postponement of the exhibition of domestic manufactures, and the Institute have given their sanction to the act. The committee on premiums and exhibitions have not suffered the time to pass unimproved, and should their successors finish the work with the same zeal with which it has been begun, much may be expected for the next autumn.

Of the proceedings of the general committees an equally satisfactory account may be given. The committee on water power have finished the publication of their last experiments on water wheels, which they propose to follow up by deductions from the series; and to complete their task by the publication of the experiments, made by them, on the discharge of water. The preparation of the numerous

tables already given to the public has proved that the committee are not averse to labour, and that the delay in their publication has been incident to the nature of the case. Actively employed in business pursuits, the committee have accomplished an extensive series of experiments, and the preparation of the results for publication, within a period less than that which has, in other cases, been considered necessary, to obtain results of much less practical importance, and requiring, in their attainment, much less labour.

The committee on explosions have examined the different subjects proposed in the outset of their inquiries, nearly to completion, but new inquiries have suggested themselves, and required a new devotion of time to obtain the answers to them. An account of the results of the experiments is understood to be in part completed. One branch of their general inquiry deserves specially to be spoken of as involving much delay in its prosecution, namely, that upon the strength of materials used in the construction of steam boilers. The committee have made so extensive a collection of these materials, from different parts of our country where they are manufactured, that more time must be consumed in the satisfactory termination of the examination than would appear possible to those not conversant with such experiments, or who have not visited the experiment room. The committee are understood to be present twice in each week, at their room in the Hall of the Institute, and have repeatedly extended to the members of the Institute an invitation to inspect their proceedings.

The Board of Managers would respectfully submit for the consideration of the Institute, the proposition to change the character of the monthly meetings now held, and to substitute for them conversation meetings. Trial has shown that practical men are unwilling to come forward in a public and formal meeting with the results of their experience, and the present monthly meetings are less and less regularly attended. An experiment could, in the opinion of the Board, be made with advantage, to open the reading room for conversation on the fourth Thursday of each month. At these meetings new machines might be exhibited and explained, new facts in science examined, without the formality attending the present meetings, while the quarterly meetings of the Institute would still afford opportunities for the reading of papers, the formal discussion of subjects, the reports of committees, &c. &c.

The diploma of membership has been completed, and is now ready for distribution to the members. A small price has been put upon it to defray the expenses attending its preparation; the sum cannot be felt as a tax upon individual members, but would have been a deduction from the income of the year, which must have interfered with some portion of the expenditure, for the purposes of the institution.

The Board have had, during the past year, a most disagreeable duty to perform, in relation to the arrearages due by delinquent members; they have felt it a duty to put in force the provisions of the constitution under which they are appointed, and in doing so are fully aware that the measure must be unpleasant in individual cases:

their course was plainly marked out, and they have not felt at liberty to depart from it.

During the year, 126 members have been added to the association, by election, and eleven have become life members, whose names are as follows:—

Frederick Brown
Joseph Drayton
Joseph Parrish, M. D.
Benjamin Smith
John Sartain
Arthur Murphey
H. C. Carey
A. Hart
E. L. Carey
George Gilbert
Reuben S. Gilbert

The Treasurer's report is herewith submitted. By it the receipts for the past year have amounted to $9,791 64, and the payments to $9,249 04, leaving a balance in the treasury this day of $1,021 37.

Isaac B. Garrigues, Chairman.

William Hamilton, Actuary.

A List of subscribers to the collection of apparatus for the lecturer on Machines.

Alex. Dallas Bache
S. V. Merrick
Charles H. White
John Agnew
John Wiegand
M. W. Baldwin
S. J. Robbins
Rufus Tyler
J. G. Harker
John O'Neill
J. H. Bulkley
John Struthers
John C. Trautwine
Frederick Fraley
N. J. Kennedy
W. H. Keating
George W. Smith
Benjamin Say
Edmund Draper
Jacob Farnsworth
John B. Trevor
John T. Sharpless, M. D.
Isaac B. Garrigues
M. D. Lewis
Isaiah Lukens

Bibliographical Notice.

American Almanac and Repository of Useful Knowledge, for the Year 1833.* Boston, published by Gray & Bowen.

This valuable work has just reached our city. It is the fourth number of a series, the commencement of which may be considered to have formed a new era in works of this sort. With much of the scientific information presented by the elaborate astronomical epheme-

* This notice, which was prepared nearly three months since, has been mislaid; we insert it now from the consideration that justice should not be entirely withheld, because accidentally delayed.—Com. Pub.

rides of Europe, this work presents other useful general information; it is a Repository of Useful Knowledge, as well as an Almanac.

The patronage of astronomical science and of general information is, probably, not yet sufficient in amount to command separate annuals; but this work, occupying both grounds, should, surely, be well supported. We subjoin a list of the contents.

Part I.

Calendar and Celestial Phenomena for the year.—Signs of the planets: chronological cycles: signs of the zodiac: length of the seasons: ember days: moveable festivals of the church in 1833: Jewish calendar: Mahometan calendar: eclipses in 1833: occultations: eclipses of the satellites of Jupiter, 1833: aspects of the planets in 1833: height of the greatest or spring tides: tide table: latitude and longitude of places in the United States: length of the longest and shortest days in several cities in the United States: calendar, January, &c.: Ephemeris of the sun: true and apparent places of the principal fixed stars: elements of eclipses and occultations: elements of occultations, &c.: Young's refractions: table of the sun's parallax and altitude.

Meteorological Information.—Red snow of the Alps, &c.: showers of dust and of soft substances, both dry and liquid: meteoric stones: mirage: halos: parhelia or false suns: lightning rods.

Part II.

United States.—Address of George Washington at his inauguration as president of the United States: executive government: regulations in relation to patents, copy rights: act for the relief of insolvent debtors to the United States: act for the relief of officers and soldiers of the revolution: congress of the United States: public lands: intercourse with foreign nations: the judiciary: commerce: tariff of duties: bank of the United States: public debt of the United States: receipts and expenditures: estimated receipts in 1831: mint: rates of postage: coffee trade: colleges in the United States: theological seminaries: medical schools: tabular view of education: religious denominations: census of 1830.

Individual States.—Maine: New Hampshire: Vermont: Massachusetts: Rhode Island: Connecticut: New York: New Jersey: Pennsylvania: Delaware: Maryland: Virginia: North Carolina: South Carolina: Georgia: Alabama: Mississippi: Louisiana: Tennessee: Kentucky: Ohio: Indiana: Illinois: Missouri: District of Columbia: Florida Territory: Michigan and Arkansas Territory: Governors of the states, &c.: state legislatures, &c.: table of elections, &c.

Independent States.

Europe.—Reigning sovereigns of Europe: statistical table of Europe: naval forces of Europe: cultivation and produce of Europe: mineral productions: Sweden and Norway: Russia: Denmark: Belgium: Holland: Great Britain—England, Scotland, Ireland: France: Prussia: Saxony: Wurtemburg: Bavaria: Austria: Switzerland: Spain: Portugal: Sardinia: Two Sicilies: Turkey.

Commerce of the United States: chronicle of events: progress of the cholera.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JULY, 1832.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the *Process of manufacturing White Lead;* Edward Clark, Civil Engineer, city of New York. First patented December 4th, 1828. Surrendered and reissued on an amended specification July 3, 1832.*

(See specification.)

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2. For machinery for *Sawing, flatting, moulding, beading, and polishing marble*, and other kinds of stone; Isaac D. Kirk, city of Philadelphia, July 3.

A circular stone saw, that is, a saw without teeth, is to be placed on a shaft to run vertically; and by means of a toothed wheel and pinion a rapid motion is to be given to it. The marble, or other material to be wrought, is placed upon a carriage below the saw, and by raising or lowering this carriage, the piece may be cut either partially or entirely through.

In the forming of mouldings, beads, &c. wheels of copper, brass, pewter, iron, or other metal, are to be substituted for the saw; the face of such wheel being brought into the proper shape. Sand and water are to be allowed to drop from a hopper on to the work.

There is no claim made, but the patentee says that "it is in part an old machine, but applied to a new purpose."

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3. For an *Alarm for Watches or Time Pieces;* Robert Wilson, Williamsport. Lycoming county, Pennsylvania, July 3.

About six or seven years ago, numerous alarms were made and described in the journals of the day, or secured by letters patent, which alarms were to be operated upon by a common pocket watch. The arbor of the minute hand was made to pass into the end of an arbor attached to the alarm, and formed like a watch key. Provision being made for setting the alarm to ring at the appointed time, and the watch being left in its place, when the hour arrived a pin was made to disengage a spring, which was thus set at liberty, and, in its unwinding, caused a bell to ring.

The present machine is one of this description, but as it does not recommend itself by greater simplicity than was possessed by several of its defunct predecessors, and only accomplishes the same end by a change in the arrangement of the wheel work, it does not require a particular description.

The claim made is to "the before described alarm for watches, or time pieces, particularly the watch work, fly, and mainspring."

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4. For a *Winnowing Mill;* Daniel Davis, Cornish, Sullivan county, New Hampshire, July 5.

* Reissued since on an amended specification.

The principal improvement claimed on this machine is in the form given to the leaves of the fan, which stand spirally round their axis, like those of a smoke jack. These, it is said, draw and press the air obliquely through the mill with a steady current. Riddles, or sieves, are formed by punching holes of the size required, through thin sheet metal, or parchment. These, with the manner of forming the shoe, are the only novelties mentioned.

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5. For an improvement in the *Double-iron Plane;* William B. Reynolds, St. Clairsville, Belmont county, Ohio, July 7.

Although some pains have been taken by the writer of the description of this improvement, it is yet somewhat obscure. The object, however, is to use set screws to adjust pieces upon the plane iron so that they shall fit into corresponding mortises on the cap iron, in order that it may at once fall into its right place. The mode of effecting this, seems to us more complex than necessary. We have, in fact, seen a much more simple arrangement for the same purpose; still, the common method is certainly susceptible of improvement.

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6. For an improvement in the *Mode of pointing Pegs and pins;* James Hall, North Bridgwater, Plymouth county, Massachusetts, July 7.

The points upon pegs, or pins, are to be formed upon the face of the block, before the pegs, or pins, are split out. To effect this, a shaft carrying the necessary cutters, is made to revolve horizontally. These cutters may be formed of plates of steel, like circular saws, but having their edges bevelled in such manner as shall give to the point of the peg the form which may be required. A number of cutters of this description may be passed on to the shaft, and held there by a screwed nut. Instead of so forming the cutters, grooves may be made around a steel cylinder, and the teeth be formed by filing across them. The patent is not taken for any precise mode of making the cutting tool, but for the modes of construction whereby a circular motion is given to the teeth when in operation, and thus forming the points, as set forth in the specification.

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7. For a *Thrashing Machine;* M. L. Flaglor, city of New York, July 7.

A feeding cylinder of eight or ten inches in diameter, and set with spikes like those on the beating cylinder, is to draw the grain from the feeding board, and carry it between the beating cylinder and the concave. Between the feeding board and feeding cylinder there is an open space to allow stones, or other hard bodies, to fall through. A cover is extended over both cylinders. The claim is to "the position of the feed board in relation to the front cylinder, by means of which stones and other articles improper to pass into the machine, are suffered to drop to the ground. The *association* and *position* of the front cylinder, with the arch cover of said cylinder, by means of which the

grain is carried over to the beater, and the dust prevented from blowing upon and suffocating the person who feeds the machine."

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8. For a *Machine for Napping Hats;* Gerrard Scott Petty, and Hiram Wortham, Lancaster, Gerrard county, Kentucky, July 9.

A cylinder is made by taking two round heads and uniting them by slats extending from one of them to the other; the heads, and also the slats, are to be covered with cloth on the inside, and the hats to be napped are placed within this cylinder. A box which contains hot water, and which has a small boiler below it, is made of such size as to allow the cylinder to revolve within it. Four troughs, or buckets, placed edgewise upon the cylinder, extend along it from head to head, and as the cylinder is made to revolve, these dip up the water, and pour it upon the hats.

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9. For an improvement in the *Corn Harrow, and Grain Cultivator;* Nathan Stantor, jr., Florida, Montgomery county, New York, July 9.

The first claim made is to the form given to the teeth, which are to have a cutting edge in front, being made angular, instead of flat, upon the face. The second is to a shoulder made round the neck of the tooth, to serve as a brace to it. The third is to fastening the teeth to the frame by means of a screw and nut, instead of by a key. There are some other things of the same character, and of about equal importance, but we think it unnecessary to carry the enumeration any further. Be it remembered, however, that if any one has made the cultivator teeth with angular fronts, or has fixed them to the frame by means of nuts and screws, they will, by so doing, have rendered this patent null and void.

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10. For an improvement in the mode of *Manufacturing Oakum from Junk;* Ebenezer Cook, Haddam, Middlesex county, Connecticut, July 9.

The patentee sets forth in his petition that he has invented a mode of softening the junk from which oakum is to be manufactured, which is very superior to that heretofore followed, which consisted in allowing it to stand for a considerable length of time in kettles containing hot water; that in the new process the water into which the junk is thrown is put into rapid motion, whereby the fibres of the junk are so far separated as to render the picking easy, and at the same time, the oakum is of a very superior quality.

The machinery ordinarily used by him consists of a cistern, or vat, resembling the vat of the beating machine used in paper making. In the place of the revolving cutters, or beaters, there is a paddle wheel, the revolution of which keeps the water and junk placed in the vat in constant motion. A furnace is so fixed at one end as to keep the water constantly heated, and the whole is covered to prevent evaporation.

The claim is to the method or principle of making oakum, and preparing the junk for that purpose by *keeping it in motion or circulation in hot water*, in the manner hereinbefore described, or by different machinery, or in any other manner."

The description is drawn up with much clearness, and the claim very distinctly made. We are always gratified when we meet with papers of this character, as in the greater number of instances the interest of the patentee is put in jeopardy from defects in these points.

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11. For an improvement in *Rail-Road Carriages;* John C. Blanvelt, Rockland county, New York, July 11.

This carriage, like that patented by Samuel T. Jones, and described in vol. v. p. 149, is to run upon two wheels only. The gudgeons of these wheels work in slots which prevent them from having any bearing above or below them, although they are checked by the sides of the slots. The axis of each wheel has its bearing upon the peripheries of two friction wheels, placed above it, one on each side of the main wheel.

A jointed rod serves to connect two such carriages together, the joints allowing of a lateral, but not of a vertical motion. The box or body of the carriage, is suspended between the wheels, the axis of the latter not crossing from side to side, but each wheel having its own axis supported by a frame on the side of the body.

We really are at a loss even to guess what is intended to be patented in the present instance. There is nothing new in the friction wheels, in the running upon two wheels only, in the connecting of two such cars by a jointed rod or in the frame for the wheels; the whole being included in the patent of Mr. Jones above alluded to.

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12. For a *Cooking Stove;* David Gassner, city of New York, July 11.

Cast, or sheet iron, may be employed in the construction of this stove, which is designed principally for the burning of anthracite. The grate is to be made of bars, and occupies the centre of the stove. On each side of it there is an oven, so placed that the heated air of the stove may circulate below, above, and around it. Holes in the top admit boilers, &c. to be placed over the fire, and through one of these the fire is to be fed; at least we suppose so, seeing no other provision for that purpose.

Our readers may be ready to inquire after the supposed novelty in the construction of this stove; the patentee is himself silent upon this point, and we shall not presume to speak for him. All we can say respecting it is, that we do not know of another stove exactly in the same shape as this.

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13. For an improvement in the *Mode of Ornamenting the Walls and Floors of Rooms, &c.;* Thomas Boynten, Windsor, Windsor county, Vermont, July 12.

The mode of ornamenting here proposed is denominated *Elastic*

Stamp Painting. The elastic stamp is made by casting a mixture of glue and molasses, like that used for the making of inking rollers.

A reversed mould is to be made and oiled, and upon this the composition is poured. It should be about half an inch in thickness when on the mould, and after it has been cooled and removed from it, it is to be fastened on to a piece of wood, the face of which is cylindrical, and having its back furnished with a handle. The composition mould is to be painted to prevent its drying too hard. To use it, the colour is to be spread upon a pallet board with a brush, the mould applied to it, and the colour then transferred to the wall, &c. by giving a rolling motion to the elastic stamp.

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14. For a *Stereotype Block;* Abiel Chandler, Concord, Merrimack county, New Hampshire, July 13.

This block is to be made of mahogany, and to have its edges covered with plates of iron, or brass, in the usual manner. The shanks of the moveable hooks are forced off by spiral springs which surround them, and thus relieve the plate when it is intended to be removed. A steel spring, which is a longitudinal strap, extends from one of these hooks to the other, and serves to keep them up to their bearings when the plate is on. An eccentric button, or cam, is placed so as to operate against the middle of this spring; and a notch in the end of it, admits a common screw driver, by the turning of which the catches are forced forward, or released.

The claim is to the use of the cam and spring as described, for the purpose of imposing, or fastening, the plates on to the blocks.

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15. For a *Socket Spade;* Charles Richmond, and Samuel Caswell, jr., Taunton, Bristol county, Massachusetts, July 13.

(See specification.)

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16. For a *Double Milk Can;* Artemas Crittenden, West Turin, Lewis county, New York, July 14.

Two milk cans are to be prepared, one of them about two inches less in diameter than the other; this is to be placed within the larger, preserving the same distance between their bottoms. The space between these is to be filled with cold water, when milk is to be kept cool, or in winter warm water may be put in to prevent its freezing. A cover is made which fits exactly into the inner can, and slides up and down in it like a piston. There is a screw for raising or lowering this cover, and retaining it in its place, and a close shutting door is hinged on the top of this cover, which may be opened when milk is to be dipped.

The use of this inner sliding cover, is to keep the milk from being dashed about, whatever motion may be given to the can; for this purpose the cover is to be forced down so as to come in contact with the surface of the fluid; whenever, therefore, a portion of the milk is dipped out, the screw is turned, and the required pressure made.

The claim is to the double can, and the moveable cover.

17. For an improvement in the *Grist Mill;* Joseph C. Gentry, city of Philadelphia, July 14.

Another portable grist mill is here presented to us, which differs from those before patented, principally, in the mode of holding down the running stone; there are some other points of difference particularized, but viewing them as of minor importance, we shall describe only the former.

A flat bar of iron crosses from side to side of the frame, the spindle revolving within a hole made in the middle of this bar. There is a shoulder, or collar, upon the spindle, close under the bar, and bearing against it. The two ends of the bar are perforated so as to allow it to slide up and down upon two round bolts of iron. These bolts are surrounded by spiral springs above the bar, which press it down, and cause it to bear upon the spindle collar. The upper ends of the springs bear against nuts, which being tapped press upon the bar, may be screwed down to increase the pressure.

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18. For a *Double Coffee Mill;* Thomas W. Witherby, and Joseph Torry, Millbury, Worcester county, Massachusetts, July 17.

The difference between this mill and the cast iron vertical coffee mill used by most persons, consists in its being furnished with two revolving toothed nuts, covered by two corresponding shells. One handle serves to turn both; and one regulating screw to set them. The hopper has a moveable partition in it, allowing two different articles to be ground, without their interfering with each other; or, of course, both may be used for the same article.

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19. For a *Washing Machine;* Watson W. Woodburn, Greensboro, Guilford county, North Carolina, July 18.

A cylinder about eighteen inches in diameter is made to revolve in a suitable trough. The surface of the cylinder has on it a number of semi-cylinders of about an inch in diameter, and placed an inch apart. Within the trough there is formed a concave, which consists of rollers turning upon gudgeons, and between these rollers and the rounds on the large cylinder, the clothes are to be washed. The frame which sustains the concave, rests upon spiral, or other springs.

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20. For a *Washing Machine;* Isaac S. Wright, Weedsport, Cayuga county, New York, July 18.

(See specification.)

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21. For an apparatus for *Separating Iron Ore from any extraneous matter,* called a "separating machine;" Joseph Goulding, Reeseville, Penn county, New York, July 18.

The design of this machine is to employ magnets for the purpose of separating the available ore from the extraneous matter with which it is mixed. To effect this the ore must be pulverized before passing it through the machine. Those who are acquainted with the nature

of ores will at once perceive that the apparatus spoken of cannot be applied to them indiscriminately, but to those only which are denominated magnetic. There is much iron ore, of excellent quality, which does not possess this property; and sometimes these and the magnetic ores are to be found in the same mine. In either of these cases the machine to be described cannot be usefully applied.

A hollow cylinder is to be made, which, in the machine referred to in the specification, was about four feet long, and two feet eight inches in diameter. This cylinder has no gudgeons, but its periphery rests upon those of two cylindrical rollers, and motion being given to these the cylinder is also turned. It is lined throughout with short magnets, confined in their places by means described in the specification. The cylinder is a little inclined, like a bolting screen, and the pulverized ore being introduced at the elevated end, the refuse matter escapes at the other. In its passage, the magnetic ore adheres to the magnets, and from these it is swept off by a revolving brush, into a trough passing through the cylinder.

The patentee claims as his invention, "the hollow cylinder prepared as before described, and the manner of separating the ore therefrom within the said cylinder."

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22. For a *Machine for Sawing Circles;* Thomas Armstrong, Anderson, Hamilton county, Ohio, July 19.

We suppose that the circles mentioned in the title of this patent, are merely circular segments intended as felloes for wheels, or other similar articles. This apparatus could not be applied to the sawing of a circle, whether made as described in the specification, or as shown in the drawing. A saw is to be strained in a frame in the usual way, and worked by a pitman between fender posts. The carriage to support the timber, works upon a pin, which is to be the centre of the segment to be sawed.

Excepting in the form given to the framing, there is no difference between this machine, and several others for which patents have been taken.

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23. For an improvement in *Stoves for Burning Coal;* Ephraim Baldwin, Gibbonsville, Albany county, New York, July 19.

"The principle of the improvement consists in connecting an oven with the stove in such a manner as that the fire shall communicate to it a sufficient degree of heat for the purpose of baking, cooking, &c., and at the same time leave the stove, as to its ordinary structure and purposes, unincumbered by the same."

The mode in which this is to be accomplished is to lengthen the top plate of the stove, or furnace, so as to extend out behind the usual square body, and upon this plate to construct an oven, around which the flue is to conduct the heated air. There are suitable openings in which to place kettles for boiling.

We have given, in the words of the patentee, the object of his patent, and, in our own, a brief exposition of the means pursued by him

in attaining it. We see but little more in it than one of those variations in form of which stoves acting upon the ordinary principles are susceptible to an indefinite extent.

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24. For a *Machine for punching holes in Raw Hides or other hard material;* William Angell, Providence, Rhode Island, July 19.

The patentee informs us that the machine which he describes has been heretofore used by him only for the purpose of punching the holes through power loom pickers, to receive the wire which holds the pickers together; but although it may have been used by him for that purpose only, a machine very similar to it has been long in use for a great variety of purposes. The fact is that it is the common screw press furnished with such punches as adapt it to pricker leather, and such a bed as suits the work to be done. It is observed that the screw may be dispensed with, and a lever, heart, or other motion, employed, and the machine is claimed in either of these cases.

If the particular construction of the bed, adapting it to a special purpose had alone been claimed, the claim might have been good, but we see no discrimination in this particular, the terms employed embracing every thing described.

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25. For a *Cotton Spreading and Picking machine;* John C. Whitin, Northbridge, Worcester county, Massachusetts, July 20.

This spreading and picking machine is constructed like some others now in use, but the wire cylinders are to have a flanch, or heading, on each end, projecting about two inches, so as to retain the sheet or lap of cotton, with a smooth, compact edge. All the moving cylinders, rollers, &c., excepting the beaters, are to be geared, and these are to be run as usual by straps. The claim is to "the application of gearing to the several movements, instead of belts, and of the flanch or rim to the ends of the several wire cylinders."

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26. For a *Coffee Mill;* Ammi Clark, Berlin, Hartford county, Connecticut, July 20.

We are told by the patentee that his improved coffee mill is made of cast iron, "and consists principally of a double runner, two shells, an axle or shaft, and a crank."

By turning to No. 18, it will be seen that a patent was granted for a coffee mill which was "furnished with two revolving toothed nuts, covered by two corresponding shells." It seems, however, that this last was not the original double mill, as the present patentee, whose papers have lain some weeks in the patent office, says that he does not claim "the double mill heretofore invented and said to be patented by a person unknown, having shells with radiating teeth," &c. &c. but he claims only the peculiar construction of his own; by which nearly double the work can be accomplished in a given portion of time."

We apprehend, however, that this double labour will not be accomplished with the same degree of power, although something may be saved in this particular, as regards friction.

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27. For an improvement in the form and construction of *Gridirons;* Fenner Bush, Meriden, New Haven county, and Linus Pratt, Middletown, Middlesex county, Connectictut, July 21.

In the first part of the specification of this patent we are informed that the improvement consists in so constructing and arranging the parts of the gridiron as to preserve the pieces of meat which may be broiled on them; so shaping them as that the whole may be made of cast iron, or composition metal; and that the principle is equally applicable to the instrument whether made round or square.

The square gridiron is to be cast in one piece, with the bars fluted, and leading into a trough which runs along the front, or handle end, of the gridiron, which trough is to receive the gravy that runs along the flutes of the bars. The round gridiron has the bars radiating from the centre, towards which they descend, the upper surface being dishing, or concave. This revolves upon a pin projecting from the lower piece, or stand, of the gridiron, which is cast so as to catch and retain the gravy.

We have before had occasion to notice gridirons upon this principle, and have known them for upwards of forty years. The patentees are aware that the general plan is not new, but state that they have heretofore been made wholly, or in part, of wrought iron, and that although gridirons have been sometimes made of cast iron, yet these have not received the form requisite to preserve the gravy. They claim, therefore, the casting the square gridiron in one piece, and the round one in two pieces, in the way which they have specified.

To us it appears, from the evidence of the patentees themselves, that there is nothing new in the principle, or general plan of the instrument, nor in the material of which it is formed, but that they are the first who have made patterns to cast such gridirons as have heretofore been made of wrought iron, giving them, of necessity, such a form as would enable them to deliver from the mould.

We have repeatedly expressed the opinion that a claim of this description does not include such an amount of novelty either of invention or discovery as is requisite to become the secure foundation of an exclusive right.

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28. For a *Machine for Grinding Cylinders which require to be perfectly straight and true,* called a "Traverse Grinder;" Jonathan Bridges, Troy, Bristol county, Massachusetts, July 24.

Steel and other cylinders, are frequently ground perfectly true by fixing a stone, or other grinder, upon a shaft parallel to that of the cylinder, and causing it to traverse from end to end of the cylinder; a rotary motion, generally in opposite directions, being given to each. The shaft of the grinder is, in this case, made cylindrical, that it may

slide within collars at either end of the machine. The shaft of the grinder must, necessarily, be at least double the length of the cylinder to be ground. The present invention is for an application of the same mode of grinding, but by machinery which is differently arranged. The shaft upon which the stone, or other grinder, is placed, does not traverse backward and forward, but the grinder itself slides from end to end of the shaft. The latter is made cylindrical, and is grooved from end to end, and a piece projecting from the hole in the grinder into the groove, prevents it from turning round upon it, and guides it as it traverses along. There are pulleys placed upon the shaft of the cylinder to be ground, bands from which give motion to the grinder shaft. The apparatus which gives the traversing motion to the grinder, would require an engraving for its perfect explanation. The claim is to the particular arrangement of the machinery by which this is effected.

It is contemplated to apply this instrument to the grinding of cylinders of all kinds, whether of wood or metal, and particularly to piston shafts and card cylinders. In grinding cards it is observed that it may be fixed in the place of the doffer cylinder, and moved by means of a bolt from a pulley on the main card cylinder shaft, its construction admitting of its being carried to the body to be ground.

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29. For a machine for *Hulling Clover Seed;* George Wales, Centre Township, Union county, Pennsylvania, July 24.

On looking at the drawing appended to the specification of this patent, we immediately recognized the machine as similar to one which we had previously described; in the greater number of cases this would not have been a noticeable circumstance, but there was much of novelty in the form of the original, and of course something to be remembered. In the progress of improvement two great geniuses may and sometimes do, without any communication with each other, make the same discovery: full of impressions of this kind, we sought for our notice of the original patent, and found it at p. 156 of our last volume. If we were struck by the similarity of the two machines, we were still more surprised at the coincidence of the residence of the two inventors, both of whom have their address, New Berlin, Union county, Pennsylvania. Some malignant spirit might dare to suggest the idea that as the patents bear date more than four months apart, one of them might be a borrowed plume; far be it from us to suspect any such thing; the patentees have both sworn that they are the true and original inventors, and that's enough.

In the notice of the former patent, it was stated that a spiral row of wooden pins was placed round the cylindrical part of the shaft, and that these were for conveying the heads to the rubber; instead of pins set spirally, the present patentee prescribes a continuous projection, like the thread of a screw, and we are informed that "the revolving screw-formed cylinder is for conveying the clover to the rubber, where the seed is rubbed out. The former description, excepting in this immaterial point, will serve for the present machine

most perfectly. The claim made is to "the before described machine for hulling clover seed, and chopping grain, particularly the revolving screw-formed cylinder, or conveyor, and its case or cover, made of any material whatever."

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30. For an improved mode of *Straining Buck Saws and Bow Saws in their Frames;* Teunis V. Leroy, and Abel Sandford, Newport, Herkimer county, New York, July 25.

Wood, and other framed saws, are usually strained by means of a twisted rope, instead of which the present patentee proposes to use iron screws. Iron wire sufficiently stout is to be bent so as to form a loop, the two ends of the wire uniting in a screw nut. There must be two such loops, one to pass over the head of each end of the saw frame. The nuts are to be tapped with a right and left handed screw, and an intermediate rod, tapped to fit them; this, when turned by hand, will strain the saw.

The improved construction is particularly described, and is limited to the precise mode noticed above. Any claim, in fact, which would have embraced the tightening by means of a nut or thumb screw, generally, would have been void, as saw frames have been frequently so made. We do not see the necessity of a right and left handed screw, even when the tightening rod is made with loops, and an intermediate rod uniting them, as proposed by the patentee; for the same end would be answered by screwing one end, and making the other to swivel; and according to the terms of the specification, the patent would not be violated by this modification. After all, however, we believe a rope to be the best means of tightening saw frames; its elasticity having a favourable influence in the operation of sawing, and, we have no doubt that, in the case of catching, it tends to preserve the saw from breaking, especially in narrow turning saws.

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31. For a *Machine for Cramping Boots;* Lewis Lucas, Barre, Washington county, Vermont, July 25.

A cramp, made nearly in the usual form, is fixed in a groove between two uprights, forming a part of the cramp frame, the edge over which the leather is to be forced standing uppermost. The clamps which are to embrace the cramp, and force the leather over it, are made either of wood or iron, and they are hinged by their upper edges to a follower, which slides up and down in the frame. By means of a screw bolt and nut passing through them, they are gauged so as to adapt them to the thickness of the leather. A screw passing through the head block of the frame serves to force the clamps down. The lower edges of the clamps are provided with holes to enable the workman to tack the boot conveniently.

There is no claim made, and we are not therefore informed what constitutes the improvements; the general plan is not new.

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32. For a *Cooking Machine* for roasting, baking, and frying

meat, bread, pies, and pancakes; James Bennet, Brutus, Cayuga county, New York, July 25.

This whole affair is but a modification of the ordinary tin kitchen. The lower part, however, is to be made so as to detach it from the upper tin reflector, and is to be in the shape of a common dripping pan. The patentee says that it is "to be about as wide again as it is long," which we confess sets at nought all our conceptions of length and width, but in a patented contrivance this may be admissible, especially when there is but little else in it that is novel.

A spit is to pass through the tin oven; hooks are to be provided on which to hang birds or other dainties; a handle is to be properly placed, and other appendages used which may be found convenient. Instead of the dripping pan which usually forms the bottom, one with fluted gridiron bars is to be substituted when broiling is to be performed; the machine must, in this case, be put over the coals. A tin reflector is to be placed over the gridiron "to draw the heat so as to cause both sides to cook at the same time;" how this and the tin kitchen are to combine their reflective powers we do not perceive. Excepting in the title, we hear nothing respecting pies, bread, and pancakes; this is to be regretted, as they are in very general favour. The inventor makes no claim to the part, or parts, invented by him, leaving it to the sagacity of others to discover the secret.

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33. For a *Machine for Churning;* James Bennet, Brutus, Cayuga county, New York, July 25.

This is the common dasher churn, the staff of which is to be worked up and down by machinery. An upright post is framed into a plank upon which the churn stands. Two iron cog wheels, one, two, or three times as large as the other, are to mash into each other, the larger being turned by a winch, or handle. A fly wheel, from ten to eighteen inches in diameter, is fixed upon the shaft of the smaller wheel, and a pin attached to one of the arms of this fly wheel forms a crank that carries a pitman, the other end of which works the dasher staff.

All these parts are fully described, and properly delineated, but, as in the case of the "cooking machine" last noticed, we are not directed to the points of novelty, and, without a finger post, we cannot find our way to them.

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34. For a *Machine for Cutting, Slitting, and Punching Iron,* and for trimming hoes, saw plates, jointing, cutting the teeth, and gumming saws; James Bennet, Brutus, Cayuga county, New York, July 25.

The body of this machine is a block of cast iron of such size as may be required by the nature of the work to be performed. A lever, secured to this by a proper bolt, is to force down dies, punches, or cutters, adapted to their respective purposes. A spring attached to the sliding bolt which carries the dies, or cutters, may be employed to raise them when the lever is raised.

We must again offer an apology to our reader, and, we suppose, to the inventor also, for the visual film by which the novelty of the contrivance before us is obscured. The thing looks so much like numbers that we have seen in different work-shops, which have been figured in various works, and which we have more than once described as forming the subject of a patent, that we are altogether unable to discover its novelty, excepting in the averment of the petition to the Secretary of State.

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35. For machinery for finishing the ends of *Bobbins or Spools;* Simeon Presbury, jr., Canton, Norfolk county, Massachusetts, July 26.

This patent is taken for an apparatus used in finishing off the ends of the bobbins or spools used in spinning machines, so as to render them perfectly true and uniform, and to correct them should they become untrue, by warping, or otherwise. The patentee states that the inconvenience frequently experienced from the irregular draft of the spools, results, in general, from a want of truth in the ends of the bobbins, a defect which this contrivance is calculated to remedy.

The apparatus consists of a mandril, or pin, of the size of the spindle upon which the bobbin is intended to run. Upon this he fixes cutters, usually three, which stand at right angles to the pin; or they may vary from a right angle when required. An enlargement, or hub, is made upon the pin, for the purpose of attaching the cutters, or they may form one piece with the hub, which may slide on to the pin, and be secured there, whilst it is capable of being removed to sharpen the cutters.

The claim is "to the application of the aforesaid revolving cutters, or other modification thereof, to the making or repairing of all kinds of bobbins, or spools, used in spinning."

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36. For a *Machine for hulling Clover Seed*; Pierson Reading, Trenton, Hunterdon county, New Jersey, July 31.

The hulling part of this machine consists of two cast iron frustrums of cones, fitting one within the other, and furnished with teeth like those of the old fashioned coffee mill. The outer cone may be about a foot in length, ten inches in diameter at the larger, and eight at the smaller end. A piece is cut out at one end of it to allow of the feeding from a hopper; it is fixed horizontally in a suitable frame, and the inner cone revolves within it, at such distance as shall cause the hull to be rubbed off without bruising the seed.

The claim is to the outer and inner cones, with teeth placed spirally in opposite directions, and made sloping on one side and straight on the other.

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37. For improvements in the *Apparatus for applying either Simple or Medicated Steam to the surface of the Human Body;* Boyd Reilly, city of Philadelphia, July 31.

A patent was obtained by Mr. Reilly, on the 5th of February,

1831, for an apparatus upon which the present is for an improvement. The principal object appears to have been the rendering the apparatus more portable than it was in its original form. Instead of being in one length, it is now divided into three, which are made to fold together, so that it can be packed in a case of moderate size, for transportation. The lamp, and the tubes for the supply and discharge of the vapour, have also undergone some alteration, with the same intention. The patentee has devoted sixteen pages to the description of his improved apparatus, giving the precise dimensions, and the modes of joining all the parts used by him. As these are mere matters of arrangement having nothing to do with the principle of action, which remains unchanged, we think it altogether unnecessary to specify them.

We are left to infer in what the improvements consist, and that they are actually simply the whole of what is described and figured, there being nothing in the form of a claim. Besides the portable apparatus, however, a fixed one is figured and described; but the particular points in which this differs from the former are not explained, and it appears that they consist merely in rendering it more elegant and convenient. That the whole of the improvements now described are viewed as improvements, appears from the references given to the drawings, which are called "references to improvements." These consist of "a large portable apparatus,—the machine packed up,—tin case for do.—escape pipe drawn out—improved cap—lamp fixed for use—do. packed up,—stretching rails and fastenings, with holes for ends of bows—fixed apparatus—portable do. for the limbs—do. cone joint."

When speaking of the former patent, we took the opportunity of expressing our disapprobation of the empirical employment of agents of great activity. In the hands of ignorant persons machines of this description have been extensively used; like all active, quack applications, its victims have been numerous, and they have frequently been increased by the humane exertions of intelligent men to stay the evil. In the hands of the scientific and experienced physician, there are but few of the advertised medicines which may not be used advantageously, as they are, in fact, nearly all of them, compounded from his occasional prescriptions; but that which would relieve a patient to-day, may kill him to-morrow, the state of the system having undergone some material change. It of course sometimes happens that these quack medicines are administered at the time when they are suitable, and it is thus that their credit is sustained. If the patient lives it is the medicine which cures, if he dies, the fault is in the disease: now all these remarks apply to the particular apparatus in hand: in hospitals, and under the direction of the physician in his general practice, the vapour of water, of alcohol, and even of sulphur, applied to the body, will produce the most beneficial effects, and they have all, as well as others, been repeatedly so employed.

Were we asked why we have written these lucubrations upon this subject, we could scarcely give a satisfactory reply; perhaps it is because we are under the influence of the genius of cholera, which has

just been, and is at this moment, committing the most appalling ravages at our very doors, having been assisted in the work of destruction by the demon of ignorance and interest, whilst the science and skill that have combatted with, and often successfully repelled, the deadly foe, have not unfrequently been treated with ingratitude and insult.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for an improvement in the manufacture of White Lead, and other metallic salts. Granted to EDWARD CLARK, *of the city of New York, Civil Engineer; dated December* 4, 1828. *Surrendered and reissued on an amended specification, July* 3, 1832.

To all whom it may concern, be it known, that I, Edward Clark, of the city of New York, have invented or discovered a new and useful improvement in the manufacture of the metallic salts, usually denominated white, or carbonate of, lead, carbonate of copper, acetate of lead, acetate of copper, and the acetate, or peracetate of iron, and that the following is a full description thereof.

As the process to be performed depends upon the same principles, which ever of the salts in question is to be manufactured, with no other difference than that which will suggest itself to any chemist, I shall confine myself, in describing my mode of procedure, principally to the manufacture of white lead.

In preparing white lead, or other metallic salts, I construct cisterns, or apartments, which I denominate corroding cisterns, or apartments. The corroding cisterns may be made of wood, or of brick, or stone-work, or otherwise, either cylindrical, square, oblong, or in any other shape. When cylindrical, I have usually made them about six or eight feet in diameter, and the same in height. I find them more convenient, however, when made oblong, about eight or ten feet high, three or four feet in width, and fifteen or twenty feet in length, as the slats, or shelves, upon which the metal to be corroded is placed, or suspended, are more readily supported upon cleats attached to the sides, than they are when the width of the cistern is greater; the metal also appears to corrode better in cisterns of this form. Shelves of slats, or laths, or plank perforated with numerous holes, or of small scantling, or of strips of wood of sufficient strength, supported by cleats, are placed one above the other, at convenient heights, and when white lead is to be made, the metallic lead, made into sheets, is placed upon the shelves in coils, or is suspended from the slats, or otherwise so disposed of that the whole, or nearly the whole, surface of the lead may be exposed to the action of the vapours by which it is to be converted into white lead. When the lead is so disposed, the vapour and gases which are to effect the required changes are introduced into the corroding cistern, or are generated therein. These agents are

the vapour of vinegar, carbonic acid, and oxygen gas. The vapour of vinegar may be formed by placing that fluid at the bottom of the cistern, or in separate vessels placed in it for that purpose, and heated by steam conducted through the vinegar, or in any other way by which a temperature of about 150 to 180 degrees Fah. may be sustained in the corroding cisterns. In my original specification, I described the mode in which the cistern, or vessel, containing the vinegar, might be replenished, and also other tubes and cocks which might be employed, but did not intend, and did not, in fact, claim them as parts of my exclusive right, as they may and will be used or omitted according as the other parts of the apparatus, or process, is modified. So far as the vinegar is concerned, it is manifest that my whole object is to expose the lead to the action of its vapour, produced by artificial heat, and this may be accomplished either by causing the heat to evaporate the vinegar within the cistern, or by placing it in a boiler or still without the corroding cistern, conducting it in by means of a pipe; or, instead of this, the boiler may be placed within the cistern, which may be provided with a feeding door to supply and regulate the fire, and tubes with cocks may also lead from and to the boiler to exhaust or supply it. Any practical engineer, or machinist, is competent to the making of such arrangements, and of adapting them to the purposes intended.

The quantity of carbonic acid necessary to be introduced within the corroding cistern is not great, and may be readily supplied from the fuel burnt to evaporate the vinegar. As, however, it is absolutely necessary for the success of my process to admit atmospheric air, for the sake of its oxygen, the quantity of carbonic acid required may be admitted at the same time. A gasometer, like those in gas works, may contain the atmospheric air, and a portion of that air which has passed through the fire may be allowed to commingle with it in the gasometer, being conducted into it from the escape, or smoke flue, through tubes properly fixed for that purpose, in the progress through which, it may be washed and purified if required. As no great quantity of carbonic acid is required, a work-shop, or laboratory, where there are fires, and a number of persons at work, will frequently contain the required amount; and where there is a deficiency, a small quantity of charcoal may be burnt, and its vapour conducted into the corroding cistern, or, circuitously, into a gasometer, should this method of supply be preferred. There are various other sources known to the chemist, from which the requisite supply of carbonic acid may be obtained; such, for instance, as limestone, chalk, and all the varieties of wood and coal. During the whole time the process is going on, that is, whilst the vapour of the acid, heated to the required degree, is operating upon the metallic lead, I supply the cistern, or apartment, freely with atmospheric air, which readily parts with its oxygen in the quantity required to oxygenate the metal. This supply may be given in the way indicated by means of a gasometer, or it may be forced in by bellows, or by other means. In some cases I have made suitable openings into the cistern, or apartment, and have

through them allowed of a spontaneous supply of atmospheric air and carbonic acid gas, without the use of any forcing apparatus.

I rest my claim to invention on the introduction, or admittance, of atmospheric air, or air containing oxygen gas, with the other agents or materials named; that is, the vapour of vinegar, and carbonic acid generated by the combustion of fuel, or disengaged from chalk or carbonate of lime, either pure or mixed with such irrelative matter as will not interfere with the process, in whatever way they may be generated, or produced, or by whatever means or apparatus their introduction, or admittance, may be effected, into cisterns or apartments, appropriately supplied with metallic lead, or with the metal required to be acted on.

EDWARD CLARK.

Specification of a patent for an improvement in the mode of manufacturing Spades. Granted to CHARLES RICHMOND *and* SAMUEL CASWELL, *jr., Taunton, Bristol county, Massachusetts, July,* 13, 1832.

To all whom it may concern, be it known, that we, Charles Richmond and Samuel Caswell, jr., of Taunton, Massachusetts, have invented an improvement in the manufacture of spades, which improved article we denominate the *Socket Spade*, and that the following is a full and exact description of our said invention.

A main object which we have had in view in the construction of these spades, was to form them so that they shall not be liable to clog, or suffer any resistance when in use, like the "back strap shovel," or any of those on the backs of which straps are rivetted, or other projecting part allowed, for the purpose of attaching the handle. Our mode of manufacture is applicable to spades and shovels of various kinds, and in an especial degree to those with blades of cast steel.

We make a socket of sufficient length to receive and securely retain the handle: on the lower end of this socket, we form a flanch with sufficient bearing to enable us to rivet it firmly on the front of the blade. In order to form a proper tread for the foot in using the spade, we sometimes turn over, towards the front, a sufficient portion of the upper end of the blade, removing so much of the middle part of this ledge, as might interfere with the attaching of the socket, by means of the flanch. Instead of so turning over the edge of the blade, we sometimes lengthen out the flanch, so that its upper edge shall extend along the whole width of the blade, from side to side, attaching it thereto by a sufficient number of rivets.

What we claim as new, and as our invention, is the making of spades and shovels with a socket to receive the handle; which socket is attached to the blade on the front side thereof, as above described, so that there shall be no strap, or other projection, on the back part thereof.

It is manifest that instead of forming a perfect socket, straps, em-

bracing a portion of the handle only, may be continued up from the flanch, and receive the handle in the ordinary way; but this mode of procedure, whilst it would be inferior to the socket, would still be an invasion of one of the essential parts of our right, the securing of the apparatus to receive the handle to the front of the blade only.

CHARLES RICHMOND,
SAMUEL CASWELL, jr.

Specification of a patent for an improved washing machine. Granted to ISAAC S. WRIGHT, *Weedsport, Cayuga county, New York, July* 18, 1832.

To all whom it may concern, be it known, that I, Isaac S. Wright, of Weedsport, Cayuga county, New York, have invented an improved washing machine, and that the following is a full and exact description thereof.

I prepare two, three, or more rollers, usually from four to five inches long, and from one and a half to two inches in diameter, and reeded, or fluted, from end to end. These rollers I fix within a suitable frame, or box, sufficiently long to admit the rollers to be arranged with their axes parallel to each other, and to revolve without coming in contact. Through this frame, or box, I pass wires, upon which the rollers revolve freely; or, otherwise, I fix wires in each end of the rollers, so as to form gudgeons, which run in metal, or other bearings, in the frame, or box. I, however, prefer the former method of allowing the rollers to revolve upon the wires, as being the most durable. The wires, or gudgeons, are placed near to the edge of the box, or frame, that the rollers may project from it at least one-third of their diameter. Across the back of this box, or frame, I affix a piece of wood, a strap, or other contrivance, to serve as a handle when the rollers are used.

When this apparatus is employed for washing, a smooth board is taken, which is made in the form of the well known fluted washing board, and is placed in the tub in the same way; but the clothes laid upon it are subjected to the action of the rollers, which are passed up and down over them, instead of being rubbed by hand, and in this way they are washed more rapidly, more effectually, and with less injury to the fabric than in any other.

Instead of using a washing tub, I sometimes cause a trough to be made of suitable length and width; it may, for example, be sixteen inches wide, and three feet long, and one foot high, more or less. Sloping boards may be permanently fixed at each end, enabling two persons to wash in it at the same time. To this trough I also sometimes attach a wringing apparatus, which is made by raising two standards above the trough, one from the middle of each side, with a cross piece at top to brace them firmly. A coarse bag, a strong net, or ropes, may be so fixed to these standards that by turning one end

by means of a winch, or handle, clothes placed within will be effectually wrung. I do not claim this apparatus as my invention, it having been so long in use as to have become public property; it is only mentioned with a view to point out the facility with which it may be used in conjunction with my washing rollers.

What I claim as my invention is the above described instrument, consisting of two or more rollers, fixed so as to revolve in a suitable box, or frame, which can be held in one hand, and the rollers passed over the articles to be washed, which articles rest upon a smooth board. The rollers, instead of being enclosed in a box, may be hung in a light iron, or other frame, merely sufficient to sustain the rollers and handle in their proper positions; but I claim all such modes of fixing them by which they are so arranged as to operate upon the principle above described.

ISAAC S. WRIGHT.

Specification of a patent for Saving a great part of the water usually expended in the passing of boats through the locks of canals. Granted to JACOB DEWEES, *M. D., Pottsville, Schuylkill county, Pennsylvania, December* 28, 1832.

To all whom it may concern, be it known, that I, Jacob Dewees, of the borough of Pottsville, in the county of Schuylkill, and state of Pennsylvania, have discovered a principle by the practical application of which the water which is usually expended in the passing of canal boats through the locks may be in part, or altogether, saved, and by which it is possible also actually to increase the quantity of water in the upper level by transferring thereto a portion of that in the lower level, by the mere passing of the boat from one to the other; and the principle of which discovery may be also extended so as by a special set of locks to pass empty boats without the quantity of water which is required to fill the lock for those which are loaded; and I do hereby declare that the following is a full and exact description of the manner of constructing canals and their locks in such a way as shall attain the end proposed.

The canal and its locks should be constructed in the usual way, with this difference only, that the lift of the lock must be, in all cases, somewhat less than the depth of the canal, so that the water would, at the height at which it stands in the lower level, flow over and cover the bottom of the canal in the upper level. In the actual construction of canals this has sometimes happened to be the case, but as this has been merely accidental, and not adopted with a view to the application of the principle which I have discovered, it cannot be made in any way to interfere with any claim to the practical application of the principle on which my discovery is based. For the purpose of giving a clear exemplification of this principle, I shall refer to the diagram, or sectional view of a canal with its locks, which accompanies this specification, and makes a part thereof.

If the number of cubic feet of water which is admitted through the upper gate of a lock into the chamber for the purpose of raising the water therein from the lower to the upper level, be less than the number of cubic feet which the boat afterwards displaces by entering the chamber, it, of course, must throw back, through the upper gates as it enters, that excess which it displaces above that which was let in. Now that this may happen will appear by supposing A, fig. 1, to be the gates of the upper, and B the gates of the lower level, the dotted line C, to represent the surface of the water in the lower chamber when the lower gate is open and the upper gate shut; D, the surface of the water in the upper level, or which is the same thing, that in the chamber.

When the upper gate is open and the lower gate shut, let E represent the submersed hull of a boat, in the upper level which is about to enter the chamber, and to be let down into the lower level. When the wicket gate of A is opened, a quantity of water will pass into the chamber, which may be represented by the dotted lines C and D; now let the boat, E, enter, the hull of which, whilst in the upper level, was submersed below the water line C, of the lower level, and it is plain that if the boat was to fit the whole capacity of the chamber between its sides and the gates, it would force back into the upper, a portion of the water which originally stood in the lower level, equal to that before alluded to between C and D. But as in practice there must be some play allowed to the boat in all directions, a corresponding deduction must be made from the quantity, which however does not in any way militate against the principle: should the boat do no more than displace the actual quantity admitted from the upper level, it will still save all the water which is usually lost in the lowering of the boat.

The application of the above described principle may be still further extended to canals ascending and descending to and from a summit level, where it is important that water should be saved. For this purpose, a set of locks must be constructed for the descending boat when empty. Such a provision derives its importance from the fact, that the produce of the country, which finds its way to market along our canals, is always greater in its amount of tonnage than the articles returned by the boats, many of which will consequently pass along without loading, or nearly so. An empty boat will require in its ascent its own weight of water only, but in descending it will always require the full chamber, less its own weight. Now suppose the lift of the ordinary locks in the canal to be four feet, and that forty tons of water be required to fill it to a height with the surface of the upper level of the canal, and that the empty boat to be passed weighs ten tons, it will necessarily displace its own weight in water only, and in its descent carry along with it thirty tons. By the construction of two chambers of two feet lift each, beside the one of four feet lift, the chamber of two feet lift requiring but twenty tons of water to fill it, and the boat displacing ten tons, consequently would carry but ten tons of water with it in its descent—hence there will be

a gain, compared with the four feet lift, of twenty tons for the use of the canal.

By constructing three chambers, with a lift of sixten inches each, in place of the two of two feet each, the saving may be extended still further.

A canal, with a view to meet the foregoing principle, applied to the locks, may be excavated in such a manner as to save great expense, and very much enlarge the facilties of the trade; the side of the canal wherein is situated the lock for the passage of the heavy boat, will only require to have a channel to the greatest depth of the canal, of barely sufficient width for its passage. The side wherein are the locks for the empty boat, will only require such depth of water as will pass the empty boat, which will also be of sufficient depth to admit of the escape of the water displaced by the loaded boat, and give an increased width to the canal. Provision must be made for the passing of loaded boats at convenient and proper distances in the shoal side. There should be tow paths on each side of the canal, which will also avoid much detention.

What I claim as my invention, and for which I ask a patent, is the application of the principle herein before set forth; that is to say, the construction of canals to save the excavation, in part; in which the lift of each lock is less than that of the depth of the water in the canal, for the purpose of saving water in the passing of boats through the locks; and I do further claim the extending the same principle in the construction of locks of a less lift than those used for the passing of loaded boats, which are to be constructed along side of, or near to, the ordinary lock; the combined lift of two, three or more special locks, being equal to that of the general lock, or locks.

Jacob Dewees.

References to the Plate.

Fig. 1.

A, upper lock gates.
B, lower gates.
C, height of water in lower level.
D, height of water in upper level.
E, canal boat.

Fig. 2.

F, chamber for loaded boats.
G G, chambers for empty boats.
H H, towing paths.
I, wall between locks.
J, deep part of upper level.
K, shoal part.
L, turn out in shoal part.

Remarks by the Patentee.

In canals where there is a sufficient supply of water, but no more, the principles of the *water saving canal* may, in some parts of them,

be so applied as to admit of the employment for manufacturing purposes, of that water which is lost in passing boats through locks of the ordinary construction. To derive all the advantage from the principle of which it is susceptible, there must be a uniformity in the tonnage of the boats generally traversing the canal; and, in this case, they may be passed not only without the expenditure of any water, but may actually be made to throw from one ton to half the weight of the boat, and even more, into the upper level. I am well aware that, in practice, it is necessary to allow to the boat a considerable play in the locks, for the free passage of water around it, and that the quantity which might otherwise be thrown back, will consequently be lessened; but after making due allowance for this, there may still be a gain beyond the amount of what will be required for the ascending tonnage.

Great expense and loss are frequently caused by the necessity of taking the water from mills in the courses of new canals; by my plan this would be in many instances rendered unnecessary. In crossing summits also much will be gained; the quantity of water required for a canal on the present mode of constructing them prevents their being carried near to the sources of streams, the supply being insufficient; but by adopting my improvements, the distance from the stream on one side of a summit, to that on the other, will be much lessened, and what is still more important, the height to be ascended in overcoming its elevation, will be proportionately decreased.

The greater the depth of the canal, and the heavier the tonnage of the boat, the greater will be the facilities offered in the passage of a boat upon my principle, as the quantity of water forced up will be more than proportionately increased. Suppose a canal to be six feet deep, and the boats used on it to be of one hundred tons burden, and suppose the water at the summit to be no more than will suffice to fill the canal, to compensate for evaporation and leakage, and to supply one half of that required by the estimated trade; it is manifest that upon the common construction no more could be carried on; but by using boats of 100 tons, they might be made to supply all the water that the whole trade would require, although this could not be effected by those of twenty, thirty, or forty tons.

Canals having their courses along side of rivers, like the Potomac, Schuylkill, Lehigh, &c. where the productions of the country are greater than can be transmitted by them, may be so altered as to carry boats of heavier tonnage, and yet require less water: the only limit to the trade will then be in the number of boats which can pass in a given time. In making an estimate of the probable tonnage on a canal, it will not, on my plan, be absolutely necessary to take into view the necessity of obtaining water from extra reservoirs, to supply a scarcity.

J. DEWEES.

ENGLISH PATENTS.

Patent granted to Arthur Howe Holdsworth, *Esq. for his having invented improvements in the construction of rudders, and in the application of the same to certain descriptions of ships or vessels. Sealed November* 19, 1831.

This invention consists in so constructing and applying the rudders to ships, or vessels, that they may revolve completely round upon the axle by which they are attached to the vessel, in order that, in whatever direction the vessel may move, the rudder may be readily brought to a proper bearing in the water. The patentee considers that by this contrivance greater facility will be obtained in steering, while such rudders so applied will be less liable to be carried away when struck by a sea, or from the ship suddenly making sternway, in consequence of the rudders so applied to the ships or vessels being enabled to make a whole revolution on their axis.

It is to be observed that the invention applies only to those descriptions of ships which have a single stern and sternpost, but does not apply to double, or twin-bodied boats which have rudders placed between them.

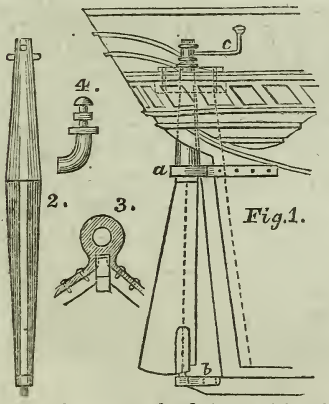


Fig. 1 represents the stern of a vessel, having the improvements applied thereto; fig. 2, is an edge view of the rudder detached. The axis of the rudder must be carried out from the lower part of the stern post, and stand perpendicularly, as shown in the figure. It is to be supported at top by a strap and collar, as represented in the detached figure 2, which strap is made fast to the transom, or to the stern frame, as near the hance as conveniently may be, and through the collar the upper part of the rudder passes, and turns in it at *a*. The lower end of the rudder is supported on an elongated part or continuation of the keel at *b*, where a metal gudgeon is fixed to receive it. The object of so mounting the rudder at a distance from the stern post is to enable it to turn completely round, without coming in contact with the stern post.

It will be seen that this rudder is without the usual pintles, and the front, or bearded part, is cut to a ridge shape; it will also be seen that in order to apply the improvements, the stern post of the vessel must be made to stand at such an angle to the axis of the rudder as will afford space sufficient for the rudder to make a complete revolution on its axis.

This rudder may be actuated by a tiller *c*, and tiller ropes; in which case there should be a strong pin in the end of the tiller farthest from the rudder; or the end of the tiller may be turned up, as shown by the enlarged fig. 3. Upon this turned up part of the tiller a swivel should be placed, having two eyes, to which the tiller ropes are attached or the rudder may be actuated by means of a pinion affixed on an upright shaft working into a horizontal toothed wheel affixed on the head of the rudder, such upright shaft having a horizontal steering wheel in the usual way, or it may be worked by any other of the usual combinations of mechanism employed for steering, care being taken that whatever mode be adopted, whether by tiller or otherwise, a whole revolution can be made by it.

In steering a vessel which has these improvements in the construction and fixing of the rudder applied, it will be necessary in the event of its being desired, that the ship should make stern way, for the man at the helm immediately to let go the wheel or steering apparatus, and on the ship moving by the stern, the rudder would revolve upon its axis and turn into the space left between the stern post and the axis, and be in a line with the keel: when the helmsman will again take hold of the tiller or wheel, and would be enabled to cause the rudder to take any angle with the keel consistent with the new course of the ship; and when she was required again to make headway, the helmsman would permit the rudder to revolve into the position shown at fig. 1.

The specification concludes by saying, "Having described the nature of my invention, and the manner of performing the same, I would have it understood that I lay no claim to any of the parts of which the same is composed, but I claim the constructing and applying rudders to ships or vessels in such manner that they may revolve on their axis, and thus in whatever direction a ship or vessel may move, their rudders will always present their proper edges or bearings to the water, as above described." [*Lond. Jour.*

Patent granted to Augustus Applegarth, *printer*, *for his having invented certain improvements in printing machines. Sealed August* 31, 1830.

This invention applies to the printing of calicoes, silks, and other goods of that kind, and also paper for hangings, and consists in a peculiar mode of adapting engraved plates to a machine, for printing patterns or devices on those sorts of goods.

The improvements proposed may be considered under two heads; first, the peculiar method of constructing and applying these engraved plates to a printing machine; and secondly, the means by which such plates may be advantageously worked in a printing machine.

The designs, patterns, or subjects intended to be printed, are, in the first place, to be engraved upon thin copper plates, in the way

that art is usually practised for calico and silk printings. The plate is described as being equal in length to that of the bed roller of the machine, which corresponds with the width of the calico, or silk, to be printed, and the width of the plate may be equal to any portion of the pattern.

The plate, when engraved, is to be bent into the form of a segment of a cylinder, by pressing it upon the surface of a mandril, or metal roller; it is proposed to do this by passing it through the machine, by bearing it against the face of the plate, with a wooden block or stout board.

Upon the metal cylinder in the machine, called the bed roller, a segment block is to be fixed, by screws or otherwise, the surface of the block being concentric with the axis of the roller, but raised a few inches from its periphery, and extending so far round the roller, as shall be equal to the breadth or extent of the portion of the pattern engraved upon the plate. Upon this block the bent plate is to be secured by turning its edges over the sides of the block, and passing screws or pins through it into the block to hold it fast.

The material, whether silk, calico, or other goods, intended to be printed, is to be conducted in an endless length between the face of this plate on the bed roller, and the periphery of the press roller; the force of which causes the impression to be taken in the ordinary way upon the calico, silk, or other fabric, as it passes through, when the machine is put in operation: the inking of the plate, that is, supplying it with colour, being effected by a ductor and scraper as usual. It is further to be observed, that two of these segment plates may be employed at the same time, affixed to rollers, the one below, and the other above the press roller, which will afford the means of printing two distinct parts of the pattern by the same movement of the machine.

When one impression has been given, the calico, or silk, must be shifted forward, while the plate is receiving a fresh supply of colour for the next impression: observing, that the machine is to be furnished with stops, in order to arrest the progress of the calico or silk, exactly at those points which shall bring the parts of the pattern last printed, to coincide, or join correctly, with the corresponding parts of the pattern about to be printed by the next movement.

These parts, however, are common to machines employed for printing by rotary cylinders, and so are the general arrangements of the printing press, the only feature of novelty herein claimed, being the employment of a curved plate, fixed upon a segment block on the surface of a roller for printing calicoes, silks, paper hangings, or other similar kinds of articles.

An engraved plate of this construction may be employed, extending only part of the way across the machine, that is capable of printing a portion as half, or a quarter only, of the breadth of the calico, or silk, at one impression, and which of course will require to be shifted laterally to give the pattern over the whole breadth of the piece.

This is proposed to be done by mounting both the printing and pressing rollers in a frame, which shall be capable of sliding sideways.

The plate, as before described, is bent to the form of a segment of a cylinder, and mounted upon a segment block, upon the bed roller, but only extending part of the length of the roller. The frame that carries these rollers is considerably wider than the breadth of the calico or silk which passes through it, to be printed, and a projection from the frame at one end is acted upon by a rotary cam, which moves round as the rollers in the machine work. This cam is formed like a hoop or drum, with steps or inequalities in its edge or rim. Whilst the first portion of the pattern is printing, a flat part of the edge of the drum acts against the frame, but immediately afterwards an inclined plane on the edge of the drum comes opposite to the end of the frame, and allows it to move sideways, the frame being drawn tight against the cam by a weighted cord. By the time that the plate has come round again to give a second impression, the frame with the rollers has moved so far in a lateral direction as to bring the plate opposite the blank part of the piece of calico, or silk, close to the side of the former impression; the print is then given, and the two portions of the pattern perfectly join, or correspond, if the steps of the cam have been correctly made.

It is scarcely necessary to add that the number of steps on the edge of the hoop cam will depend upon the length of the plate, and the number of movements necessary to carry it across the entire breadth of the piece of calico or silk under operation.

The patentee states in conclusion, "First, I do not claim the use of any kind of circular shaped block, or plate, for printing, made by casting, hammering, turning, or by any other means than those described: secondly, I claim the divided curved plate, or the division of a curved plate for printing, either across or along the goods, by several successive operations, by whatever machinery it may be employed. [*Ibid.*

Patent granted to WILLIAM PALMER, *gentleman, for his having invented certain improvements in making candles. Sealed August* 10, 1830.

The object proposed by the patentee is, to produce tallow candles which shall not require snuffing; that is, the wicks of which shall be completely consumed in the combustion of the other materials of which the candle is made.

There are two particular points in this invention; the first is, the combination of a chemical material with the matters composing the candles; and the second is, a peculiar mode of forming the wicks.

The chemical material employed is bismuth, in a finely divided state, which may be either made to adhere to the wick, or be mixed with the tallow, so as, in either case, to burn with the candle.

The bismuth, which may be sub-nitrate, or any other preparation, is to be pounded, and finely granulated, and when that is done, it must be ground up with oil in the same way that colours are usually prepared. This material is to be applied to the threads, or yarns, of

cotton intended to form the wick, by means of a brush, which must be done by daubing, rather than painting, and the cotton will be found to absorb the oil, while the bismuth will adhere to the external fibres of the thread.

In constructing the wicks, about one-tenth of the whole quantity of cotton required, must be taken from the threads, or yarns, prepared with the bismuth; these being placed with the other nine-tenths of ordinary yarns, are to be enclosed by them, and bound round in the manner called gimping. When so prepared, the wick yarn will have acquired a slight degree of stiffness, and having cut the yarn into pieces, equal to about twice the length of the intended candles, these pieces of yarn are to be severally twisted double round a rod or wire, the lower end of the rod having a notch at the bottom, into which the yarn passed, for the purpose of preventing its slipping. The yarn thus twisted round the wire, or rod, in a double coil, resembling the *Caduceus of Mercury*, is with its rod to be inserted in the candle mould, and when the tallow in the mould has become set, or hard, the rod may be drawn out at top, leaving the wick in the candle in the double coiled form described.

The same form of double coiled wick, prepared as above, may be used for dip candles also, as well as moulds, by passing a rod through the eyes, or loops, at top of the wires, and dipping the wicks into the tallow vat in the ordinary way of making dip candles.

The advantage of this improved candle is, that as the tallow becomes consumed, the ends of the double wick will stand out sideways on each side of the flame, and the bismuth attached to the wick being acted upon by the oxygen of the atmosphere, will cause the wick to be completely consumed by the combustion, and therefore not require to be snuffed. The same effect will take place, though not so perfectly, in a single wick prepared with the bismuth, and if any superfluous quantity of bismuth should hang in globules about the wick, it will very soon be dissipated by evaporation.

An approximation to the same effect may be obtained by mixing granulated bismuth with the tallow in the proportion of about one drachm of bismuth to one pound of tallow. In candles made of this compound, when burning, the bismuth will deposit itself upon the wick, and cause its complete destruction by combustion, and require no snuffing, as above said. [*Ibid.*

Patent granted to GEO. G. BOMPAS, *M. D., for an improved method of preserving copper and other metals from corrosion. November* 4, 1830.

It having been discovered that the oxydation of metals is effected by an electric or galvanic operation continually going on between the metal and water to which it may happen to be exposed; the patentee proposes to neutralize that galvanic action, by connecting to such metal as may be in a negative state, such a quantity of another

metal, which is in a positive state, as respects the electric or galvanic circuit, as will neutralize its action.

The metals proposed to be employed, are an alloy of zinc and tin, in various proportions, according to the state of the metal to be protected, copper, iron, or lead, and according to the state of the water to which they may be exposed, whether soft, or fresh. These proportions are to be obtained by experiment; and an instrument which is capable of showing the intensity of the galvanic action, is to be employed. These alloys are to be attached to the sheathing of ships, to tanks, and cisterns holding water, and in every situation where oxydation is to be prevented; which may be done by the neutralization of the galvanic or electric action.

We do not perceive in what particulars this invention differs from that which formed the subject of a patent granted to G. Pattison, Esq. for a means of protecting the iron sheathing of ships, boats, spikes, braces, and chains, from oxydation; (see Journal Franklin Institute, vol. iv. p. 94.) [*Ibid.*

List of French Patents.

A List of Patents for inventions and Improvements, and the introduction of Foreign Inventions and Improvements, granted in France during the fourth quarter of the year 1831.*†

[TRANSLATED FOR THIS JOURNAL.]

Edward Baccuel, Paris, December 12th, (5 years.) A mechanical counter, intended to show the number of passengers who may have entered a public stage. (P. Improv.)

Archilles de Bernardiere, merchant, Paris, October 10th, (five years.) Manufacture of compound pasteboard paper, imitating Chinese paper, and paper to be used in engraving, in lithography, in drawing, for oil painting, for paper hangings, and for ladies' bonnets. (P. Improv.)

Michael Boche, manufacturer of powder flasks for loading and priming; Paris, October 10th, (5 years.) A powder flask giving the quantity of powder necessary to form a charge. (P. Improv.)

John Boivin, mechanician at St. Etienne; November 7th, (5 years.) A process for manufacturing gun barrels under the roller. (P. Improv.)

Philip Augustus Brion, architect, Paris, December 5th, (10 years.)

* The Committee of Publication have made an arrangement by which they hope to present, in future, a regular list of French patents, and also to complete the list from 1828, the date of the last list published in this Journal, to the date now given. It is known, probably, to most of our readers that the specifications of patents, in France, are not published without the request, or permission, of the patentees, until the expiration of the time for which the right was granted. COM. PUB.

† P. I. denotes a patent for inventing,—P. Improv., a patent for improving,—P. Import. a patent for importing, or introducing a foreign invention.

A new system of muskets, pistols, and arquebuses, firing from one to four and more shots. (P. I)

Stephen Chaix, Paris, October 10th, (5 years.) New arched and flat roofs for buildings. (P. I.)

Dumont Claudot, architect, Paris, November 28th, (15 years.) A method of turning off water. (P. I.)

Francis Colancon, Nismes, December 31st, (5 years.) A dyeing composition, entitled "virgin powder." (P. I.)

John Benjamin Coquatrix, suspender manufacturer, Roan, October 22nd, (10 years.) A mechanism to take the place of steam. (P. I.)

John Edward Conmeadon, John Osborn, and Samuel Dalton, all residents of Paris, November 21st, (5 years.) A composition, by them called antiglutinous, or grease which does not melt when exposed to heat, and suitable for greasing wheels of carriages, mills, and the rubbing parts of all machines. (P. I.)

Lewis Augustin Crosnier and Alexis Sauvage, Paris, October 14th, (10 years.) A new fire engine, double acting, and with a rotary motion. (P. I.)

Philibert Damiron, founder, Lyons, October 22nd, (15 years.) A process for cleansing, doubling, and twisting silk and other filamentous substances. (P. I.)

John Baptiste Mathieu Danloy, buckle and thimble manufacturer, residing at Raucourt, Department of Ardennes, December 31st, (5 years.) Tinning of steel and iron sewing thimbles. (P. I.)

Peter Francis Delacroix, manufacturer of chemical products, Roan, December 20th (10 years.) A chimney apparatus, which he calls a *multiplier*, intended to distribute heat in contiguous and upper apartments. (P. Improv.)

Nicholas Desmonds, worker in wood, Paris, December 31st, (5 years.) A wooden stuff, which he calls Scotch Carmentine, fit for different fancy articles. (P. I.)

Francis Jules Devinck, chocolate maker, Paris, November 2nd, (5 years.) An apparatus for roasting coffee and cocoa by means of steam. (P. I.)

Henry Lambert Dretzen, harp manufacturer, Paris, October 17th, (5 years.) A *double* mechanism adapted to the harp, to regulate the tension of the strings for every tone; and a *single* mechanism regulating the semi-tones of the medium high notes. (P. I.)

Duverger, printer, Paris, October 22nd, (15 years.) A process for printing music with moveable types, and in relievo, which he calls Stereomelotypy. (P. Improv.)

Nicholas Fonzi, dentist, Paris, a grantee of Ange Joseph Fonzi, December 7th, (10 years.) Apparatus of cast iron, or of any other material intended to burn coal in the open air, and free from either smell or smoke. (P. Improv. and Import.)

James Anthony Frigerio, apothecary, Paris, November 21st, (5 years.) A disinfecting apparatus. (P. I.)

Lewis Gauthier Delatouche, Paris, October 24th, (15 years.) A

folding iron bed, with an elastic back, forming mattress and bolster. (P. I.)

Lewis Gauthier Delatouche, Paris, October 5th, (15 years.) A folding iron bed, with an elastic back, forming mattress and bolster. (P. Improv.)

Augustus Girardet, mechanician, St. Etienne, October 22nd, (5 years.) A process for manufacturing gun barrels under the roller. (P. I.)

Peter Grandin, dyer, December 31st, (15 years.) A machine for extracting the colouring matter of silks, cottons, and wool, either raw or manufactured, coming from the dyeing vat. (P. I.)

Francis Anthony Henry, mechanical engineer, Paris, November 2nd, (5 years.) A fourteen shot musket. (P. I.)

Victor Houyau, manufacturer, December 20th, (10 years.) A steam boiler, which he calls a vertical cylindrical boiler, with horizontal tubes. (P. I.)

Claudius Jaillet, Lyons, October 10th, (15 years.) A machine for manufacturing all sorts of figured stuffs. (P. Improv.)

Paul Janson, Paris, October 17th, (10 years.) Process for reviving, and manufacturing, discolouring charcoal. (P. I.)

Benigne Joanne, Paris, November 2nd, (10 years.) Process for gilding and enamelling silver trinkets. (P. I. Improv.)

John Baptiste Benjamin, Paris, December 5th, (5 years.) A machine for warming carriages in winter, and preserving them from dust in summer. (P. Improv.)

Francis Xavier Laverriere, maker of weaving combs, Lyons, December 20th, (5 years.) A method of soldering weaving combs by tin; and a new sort of comb. (P. I.)

Edward Lesquin, merchant, Brest, December 31st, (5 years.) Construction of standing rigging, moorings, and crane scapements of iron wire. (P. I.)

Maness Mallet & Co., nail makers, Valenciennes, December 31st, (10 years.) A method of making nails with flat or round iron, without waste of material. (P. I.)

Samuel Morand, represented at Paris by M. Truffaut, November 21, (15 years.) A machine for restoring the original width of woven and other stuffs, when they have lost it by washing, dyeing, or printing. (P. I. Import. Improv.)

James Eloi Meunier, teacher at Vitry le Francais, department of Marne, December 31st, (5 years.) Mechanical plough. (P. I.)

Julius Pamparé, gilder on glass, October 24th, (5 years.) Method of applying gold, silver, and other coloured ornaments on every sort of varnished wood, on painted and varnished cloth, and waxed calico. (P. I.)

James Perry, of London, represented at Paris by Mr. Perpigna, December 20th, (10 years.) A metallic pen, which he calls Perryan pen. (P. Import. Improv.)

Arnoux Rivière, of Nantes, and Braithewaite, of London, represented at Paris by Mr. Callaghan, banker, December 20th, (10 years.)

A method of manufacturing and crystallizing salts. (P. Import. Improv.)

Camillus, Count of Rochefort, captain in the second regiment of dragoons, Paris, December 31st, (15 years.) A new and complete horse harness. (P. I. Improv.)

Lewis Roth, Paris, December 20th, (15 years.) An apparatus and method of evaporating and boiling sirops without injuring them. (P. Improv.)

Joseph Cesar Salarie, Nimes, October 17th, (5 years.) An agricultural instrument, which he calls amputator. (P. I.)

Anthony Salmer, surgical instrument maker, Paris, November 14th, (5 years.) Catheters of different shapes, of gum elastic. (P. I. Improv.)

Andrew Paul, Augustus Sautereau, Paris, December 12th, (5 years.) An apparatus for manufacturing oil gas, with a regulator. (P. I.)

Nicholas Seblumberger & Co., manufacturers, Guebwiller, Department of the Upper Rhine, December 26th, (5 years.) A carding and picking machine for cotton, which winds it on the bobbins in mashes fit for fine spinning. (P. I.)

Armand Peter Séguier, counsellor at the royal court, Paris, December 12th, (10 years.) A new steam apparatus peculiarly applicable to navigation. (P. I.)

Anthony Dominick Sisco, mechanician, Paris, December 5th, (5 years.) An instrument containing all the tools necessary for mounting and taking to pieces fire arms. (P. Improv.)

Mary Dorothy Bathilde Soulante, Paris, December 5th, (15 years.) A steam engine called a rarifying boiler pump, adapted to navigation. (P. I.)

Francis Vital Marten Terrasson de Fougeres, residing at Teil, Department of Ardeche, December 31st, (5 years.) Manufacturing of bricks and tiles by mechanical processes. (P. Improv.)

John Elias Vignaux, contractor for military accoutrements, Paris, December 5th, (10 years.) Shoes, or sandals, made of impermeable leather, varnished and seamless. (P. I.)

Recapitulation.—During the fourth quarter of 1831, were issued 49 patents.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

Action of Plaster as a Manure.

[Translated for this Journal.*]

It is well known that plaster, or sulphate of lime (gypsum) has been used for a long time in agriculture, as a manure for soils, particularly for those of artificial meadows. Fourcroy was the first to suggest that this substance probably acted as a stimulant exciting ve-

* By request of the Committee on Publications.

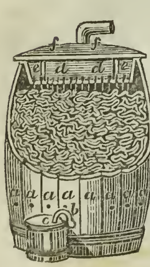
getation, and this opinion has been generally adopted. Other persons, however, have supposed that the plaster owed its power to the water which it absorbs, and which they supposed it to give up to the plant in times of drought.

M. Becquerel lately communicated to the Academy of Sciences an account of some experiments of M. Peschier, of Geneva, which throw much light upon this subject, and prove the correctness of Fourcroy's opinion. M. P. sowed in vases filled with slightly moistened sand, seeds of the water cress. He watered some of these seeds with pure water, and others with water impregnated with sulphate of lime. When the plants had attained the height of about four inches, they were burnt, and an equal quantity of the ashes of each submitted to analysis; and it was always found that the plants which had been watered with the solution of sulphate of lime, contained a quantity of sulphate of potassa, one-half greater than those to which the pure water had been applied.

In a second set of experiments M. P. caused a powerful current of electricity to pass through plants watered with sulphate of lime, and he found that it always increased the quantity of sulphate of potassa in the plants, and caused a more vigorous vegetation. The sulphate of lime is thus shown to be a powerful stimulant for certain plants; it is decomposed in the process of vegetation, and its sulphuric acid combines with potassa to form a sulphate of potassa, which thus enters in greater proportion than it would otherwise (i. e. if the sulphate of lime were not applied,) into the structure of the plant. M. P. considers that crude plaster is preferable, as a manure, to that which has been calcined.

[*Academy of Sciences of Paris, Nov. 7th.*

Process for Making Vinegar.



Much attention has, within a few years past, been paid to improving the process of vinegar making, the object having been to abridge the time consumed in the operation. The following apparatus, modified by M. Tier from the apparatus of M. Leuchs, has been extensively used. It consists of a cask of oak six or seven feet high, (see the cut,) the upper head being three and a half feet, and the lower three feet in diameter. The cask is hooped with iron, and has, about one foot from the bottom, eight holes, *a a a*, &c. bored in it, each hole being about two-thirds of an inch in diameter. Below these is an opening from which a pipe *b* passes to a vessel, *c*, placed near the cask. In the upper part of the cask is placed a slightly conical recipient, six inches high, and having a moveable bottom *d d* pierced with holes. Into four of these, glass tubes, *e e*, are sealed, projecting three inches above the bottom. A thermometer passes through this bottom into the space, *g g*, below.

This division of the cask is filled with fine shavings of beech wood, which should be well washed, and thoroughly impregnated with strong and warm vinegar; the shavings should be loose, and fill the space to within about one inch of *d d*. A small string passes through each hole in *d d*, being kept from slipping through by a knot above, and hanging so as nearly to touch the shavings. The top of the cask has a cover, through which passes a wooden tube. Connected with this tube is a second, which is carried through a refrigerating tub to condense the acid vapours which rise into it. Two buckets, used alternately, are placed above the cask, and the materials for making the vinegar being up in one of these are suffered to flow gradually into the wooden tube, and thus into the space between the tops *f f* and *d d*. The strings passing through the holes *d d* deliver the liquid in drops, upon the shavings, by which it is exposed, with an increased surface, to the oxygen of the air admitted through the holes *a*, *a*, &c. The mixture used is brandy forty parts, vinegar seventy-five parts, water 125 parts, to which, if practicable, should be added seventy-five parts of beer, (biere blanche,) heated to 144 degrees Fah. The room in which the process goes on should be heated to about 100° or 110° Fah. The mixture requires to be drawn off, and repassed once or twice through the shavings, in order to give a strong vinegar: when this is done, the brandy should be added in separate portions. By this process, in twenty-four hours, vinegar may be made, two ounces of which will neutralize 100 grains of crystallized carbonate of soda.

[*Mémorial Encyclopédique quoting Jour. für Techn. Chem.*

Action of Oils on Oxygen Gas.

M. H. De Saussure gives the following results, from his experiments on the action of oils upon air, at ordinary temperatures. The fixed oils when recently prepared, have little or no action upon oxygen gas, absorbing but a very small quantity of it. This small quantity of oxygen seems, at first, not to modify their properties, but in time it produces a change in them, by which they are enabled to absorb a much greater quantity of the gas, and are dried or rendered rancid, according to the nature of the oil. This interval of inaction is shortened, or even destroyed, by the processes of oxidation, which are practised in the arts. The drying oils differ from others in the greater quantity and rapidity of the absorption of oxygen. If the oils be further exposed to oxygen they produce carbonic acid and hydrogen, the drying oils producing less carbonic acid, in proportion to the oxygen absorbed, than others. Volatile vegetable oils resemble the fixed drying oils in their action upon oxygen, and produce but little carbonic acid and hydrogen, until they have absorbed a considerable quantity of oxygen. The absorption of oxygen removes the colour of fixed oils, and colours the volatile oils. The action of naptha upon oxygen is very feeble.

[*Ibid, quoting Mem. Soc. Hist. Nat. Genève, tome V. and Bibl. Univ.*

Essence of Roses.

It is said that the East Indian otto of roses is obtained by placing in a suitable vessel, alternate strata of rose leaves, and of the seed of a kind of digitalis, which is rich in oil. The oil of the seeds absorbs the oil of roses, and both being expressed, they may be separated by distillation with water.

[*Berzelius, vol. 5.*

Composition of Minium, (*Red Lead.*)

M. Dumas has given a detailed examination of the composition of this substance. Preparing it from the same massicot, (protoxide of lead,) he found that the quantities of oxygen absorbed, after heating at intervals of twenty-four hours, in the reverberatory furnace used for the preparation of this compound, were as follows,—

100 parts of minium had absorbed after	1	heating	1.17
"	2	do.	1.22
"	3	do.	1.36
"	4	do.	1.50
"	5	do.	1.55
"	8	do.	1.75

Ceruse absorbed oxygen more rapidly than massicot, and after three heatings the orange oxide yielded in 100 parts 2.23 of oxygen by its conversion into the protoxide.

[*Annales de Chim. et Phys.*

Tablets to be written upon with a slate pencil.

The following receipt is given by M. K. Braconnot, for making these tablets in imitation of those brought from Germany.

Silicious sand in an impalpable powder	82 parts
Lamp black	8 ,,
Boiled linseed oil	10 ,,

Grind these substances well, mix them, and add oil of turpentine. Spread the mixture with a brush upon smooth paste board. [*Ibid.*

Note on Hardening Steel.

White cast iron, which could not be worked with an English file, was drilled with tools hardened in the following manner. The end of a gun barred was filled with the fusible alloy of d'Arcet, (composed of eight parts of bismuth, five of lead, and three of tin,) which melts at 212 degrees Fah. The tools being introduced into the barrel, the mouth was closed by an iron stopper, and the whole heated to a white

heat, and then suddenly dipped into cold water. The stopper being removed, and the barrel put into boiling water, the alloy melted, and the tools were removed.

With two of these tools sixty-three holes were drilled in the bottom of a cast iron furnace, about a quarter of an inch thick.

[*Jour. des Connais Usuelles.*

Method of removing spots from mildewed stuffs.

Add to two pounds of water two ounces of volatile alkali, (ammonia.) Plunge the entire stuff into this solution, and allow it to remain there five minutes. Rince in clean water. [*Ibid.*

Method of Cleansing Gilt Frames.

Gilt frames which are exposed to the dust of the rooms in which they are hung, generally collect it on the moulding. Gilders on wood, to cleanse these frames employ very weak soap suds, but if this is not used with the greatest care, and by experienced hands, the frame soon loses all its freshness. On this account, we give the following method, which is used by a distinguished workman, who has communicated it to us. Take three ounces of white of eggs, one ounce of jeweller's wash,* beat them together, and clean the frames with a soft brush dipped in this mixture. The gilding becomes immediately bright. This operation may be repeated several times successfully on the same gilding, which could hardly be accomplished by the old method. When the frame has been cleaned, it must have a new coat of the varnish which is used by gilders on wood. [*Ibid.*

India Ink.

Take half an ounce of lamp black, half an ounce of sulphate of iron, an ounce of gall-nuts, two ounces of clean gum arabic; pulverize the whole, and grind it for five minutes on a piece of marble, adding water until it becomes of the ordinary consistence of ink. This process, which is used in Persia to make India ink, makes a most beautiful and most lasting ink. [*Ibid.*

A Composition to mend Glass, China, and Delft Ware.

We have been often consulted in relation to a powder which is sold in a shop at the Palais Royal, and which is brought from Eng-

* Eaude javelle, chloride of potassa, or soda.

land. This powder has a justly merited reputation, and all the articles which have been mended with the cement which it forms are as solid as before they were broken. The adhesiveness of this preparation is so great, that cabinet makers use it to fix the veneerign on furniture, where metal is used, and for which purpose common glue would not answer.

After numerous experiments, we have found a composition which has all the properties of the English preparation, and is, perhaps, with some variation in the proportions, the true recipe. Take one-half pound of curdled skimmed milk, wash it until the water with which it is washed remains clear, drain off all the water, then mix this milk with six whites of eggs; strain out the juice of the fifteenth part of a clove of garlick, and add it to the first two substances; pound the whole in a mortar, and add gradually sifted quick lime until a dry paste is formed, stir it until it is well mixed.

When this cement is wanted for use, a part of it is ground on a glass with a little water; when well ground, it is put upon the pieces to be mended, and placed in the shade to dry. This cement resists fire and boiling water, if it has been dried with proper care.

Valuable vases may be mended perfectly and very firmly, and the defects are concealed by painting the porcelain. The mixture of curdled milk, white of eggs, juice of garlick, may be left to dry; powdered afterwards, and mixed with an equal quantity of quick lime, and kept in well corked bottles. It is thus that this cement comes from England. [*Ibid.*

From the Philosophical Magazine and Journal of Science.

Account of a curious Chinese Mirror, which reflected from its polished face the figures embossed upon its back. By Sir D. Brewster, K. H. L. L. D. &c.

We have just received through the kindness of George Swinton, Esq. of Calcutta, whose zeal for the promotion of science is never relaxed, an account of a curious metallic mirror, which had been recently brought from China to Calcutta, and was then amusing the dilettanti, and perplexing the philosophers of our eastern metropolis.

This mirror has a circular form, and is about five inches in diameter. It has a knob in the centre of the back, by which it can be held, and on the rest of the back are stamped in relief certain circles with a kind of Grecian border. Its polished face has that degree of convexity which gives an image of the face half its natural size; and its remarkable property is, *that when you reflect the rays of the sun from the polished surface, the image of the ornamental border, and circles stamped upon the back is seen* (we presume in shadow) *distinctly reflected on the wall.*

The metal of which the mirror is made appears to be what is called Chinese silver, a composition of tin and copper, like the metal for the specula of reflecting telescopes. The metal is very sonorous.

The mirror has a rim of about one-fourth or one-sixth of an inch broad, and the inner part upon which the figures are stamped, is considerably thinner.

Mr. Swinton states, that no person he has met with has either seen or heard of any thing similar to this mirror. The gentleman who brought it from China, says that they are very uncommon in that country; and that this one, with a few others, was brought by a Dutch ship from Japan several years ago. On the back of one of these was a dragon, which was most distinctly reflected from the polished side. Mr. Swinton also mentions that he has another Chinese circular mirror, which is curiously embossed on the back. It is eight inches in diameter, but as its polish is rubbed of, he has not yet been able, by replacing it, to ascertain if it reflects a picture similar to the figure stamped upon its back. Mr. Swinton adds, that the original mirror first described, is to be sent to England, either to Sir John Herschel, or to the writer of this notice: and in the mean time he proposes to us the question, "how are these strange optical effects produced?"

Mr. Swinton himself ingeniously conjectures that the phenomena may have their origin in a difference of density in different parts of the metal, occasioned by the stamping of the figures on the back, the light being reflected more or less strongly from parts that have been more or less compressed. If metals were absolutely opaque, and if the light which they reflect had never entered their substance, as in the case of reflections from transparent bodies, then the only possible way by which they could give a picture of the figures stamped behind would be that which Mr. Swinton suggests.*

I believe, however, on the authority of the phenomena of elliptical polarization, that in silver nearly one-half of the reflected light has entered the metal, and in other metals a less portion; so that we may consider the surface of every metal as transparent to a certain depth—a fact which is proved also by the transparency of gold and silver leaf. Now this thin film having its parts of variable density, in consequence of the stamping of the figure, might re-produce the figure by reflection. It is well known that silver *polished by hammering*, acts differently upon light from silver that has received a *specular polish*, and I have elsewhere† expressed the opinion that a parabolic reflector of silvered copper, polished by hammering, will, from the difference of density of the reflecting film, produce at the distance of many miles, a perceptible scattering of the reflecting rays, similar to what takes place in a transparent fluid or solid, or gaseous medium. I am satisfied, however, that at the distance of a few inches from the Chinese mirror, this evanescent effect will be altogether imperceptible, and

*A series of pretty deceptions might be made on the same principle by painting (with thin transparent varnishes, laid on in narrow lines,) a figure on the back surface of a plate of glass. The figures would be seen by reflecting the light of the sun upon a wall, in consequence of the reflection being destroyed, or nearly so, at those parts of the back surface which are covered with the varnish, and of the light being scattered at the outer surface of the varnish. In ordinary lights the lines would not be visible, but they would distinctly appear in the reflected rays of the sun.

† Edinb. Trans. vol. xi. p. 47.

that we must seek for another cause of the phenomenon under consideration.

Some years ago I had occasion to observe the light of the sun reflected upon paper from a new and highly polished gilt button, and I made a drawing at the time of the figure which appeared in the spectrum. It consisted of radiations exactly like the spokes of a carriage wheel, the radiations being *sixteen* in number, and a little confused in the centre opposite the eye of the button. On the back of this button several words were deeply stamped, but these words did not appear in the reflected image. I have since examined several varieties of such buttons, and they almost all give either radiations or great numbers of narrow concentric rings, and sometimes both, whose centre is the centre of the button, and the smallest one of which is always like a dimple in the centre.

Upon examining the surface of these buttons in the sun's light and at the edge of a shadow,* I have invariably been able to see the same rings excavated in the polished face that appeared in the luminous image, which it reflected. They obviously arise from the button being finished in a turning lathe, and the rings are produced by the action of the burnisher, or probably, in some cases they may be the grooves of the turning tool, which have not been obliterated by the subsequent processes.†

These facts will, I presume, furnish us with the secret of the Chinese mirror. Like all other conjurers, the artist has contrived to make the observer deceive himself. The stamped figures on the back, are used for this purpose. The spectrum in the luminous area is *not an image of the figures on the back*. The figures are a copy of the picture which the artist has *drawn on the face of the mirror*, and so concealed by polishing that it is invisible in ordinary lights, and can be brought out only in the sun's rays.

Let it be required, for example, to produce the dragon described by Mr. Swinton as exhibited by one of the Chinese mirrors. When the surface of the mirror is ready for polishing, the figure of the dragon may be delineated upon it in extremely shallow lines, or it may be eaten out by an acid much diluted, so as to remove the smallest possible portion of the metal. The surface must then be highly polished, not upon pitch, like glass and specula, because this will polish away the figure, but upon cloth in the way that lenses are sometimes polished. In this way the sunk part of the shallow lines will be as highly polished as the rest, and the figure will only be visible in very strong lights, by reflecting the sun's rays from the metallic surface.

When the space occupied by the figure is covered by lines or by etching, the figure will appear *in shade* on the wall; but if this space is left untouched, and the part round it be covered by lines, or etching, the figure will appear most luminous.

* By this method the figure in the Chinese mirror could be rendered visible beneath its polish.

† In polished steel buttons the reflected light is crowded with lines running at right angles to each other, and clearly indicating the cross strokes by which they have been ground and polished.

We would recommend this subject to the notice of the optician; as to furnish him with a lucrative article of trade.

Allerly, *Nov.* 8, 1832.

¶ *Selections from Lectures on Pottery, delivered before the Royal Institution, London, by* A. Aikins, F. L. S. F. G. S.

Certain natural earthy mixtures, called clays, possess the property of plasticity; that is, when mixed with water so as to be sensibly moist, they yield readily in any direction to pressure without breaking, and when the pressure is removed, they retain the form given to them, without showing any tendency to return to their original figure. When dried, by the air or by the sunshine, or by an artificial heat not exceeding that of boiling water, they acquire a certain degree of hardness; but when pressed by a force greater than their power of resistance, they give way at once, having lost their plasticity, and having become perfectly brittle. These fragments, however, when beaten up with water, compose a mass equally ductile as at first. But if the dried clay has been subjected to a red heat, its hardness is found to be much increased; and its fragments, when broken, are no more capable of forming a mass with water than so much sand. On these two properties of clay, namely, its original plasticity, and its subsequent hardness and resistance to the action of water when burnt, the manufacture of earthenware essentially depends: the former allowing the artist easily to give to the material any figure that he pleases, and the latter giving to the ware the requisite firmness, and the capability of holding liquids, and resisting the action of most of them even when boiling hot.

Clay consists essentially of two ingredients, alumina and silica. The first of these it is which, by its combination with water, acquires that pulpy kind of consistence which fits it to be the cement of the mass; the silica is in the state of sand more or less fine, and may be considered as the passive ingredient. If pure alumina be beaten up with water and afterwards dried, however slowly, it will be found to contract greatly in all its dimensions, and in so doing will become rifty, that is, full of cracks, and will exfoliate and fall to pieces. The addition of sand, especially in the proportion of from five to ten parts of it to one of alumina, leaves the mass still plastic, and diminishes greatly the defects which would attend the use of alumina alone. A red heat, in proportion to its intensity, produces effects on alumina similar to those which evaporation does; the mass contracts, and if it is large or thick, the heat will necessarily be unequally applied; hence arises not only a diminution of bulk, but cracks and warping from the truth of the original figure. But sand, which obviates in a great degree the former defects, also corrects these, because it is neither liable to combine with water, nor undergo permanent contraction by heat. If, now, the natural clays consisted merely of silica and alumina, all their varieties would depend on the rela-

tive proportion of the two ingredients, and on the coarseness or fineness of the grains of sand. The higher the heat to which alumina is exposed, the harder and more compact it becomes, so that at length it will scratch glass, and will not admit water to rise in its pores; and as the mixture of alumina and silica in any proportions is infusible in the heat of our furnaces, it is evident that a great degree of hardness may be given, by high and continued firing, to wares made of these ingredients, and that such ware will resist the percolation of fluids; but, at the same time, in proportion to its density will be the hazard of warping during the process of being baked.

It is, however, extremely rare to find a clay which contains only the two substances above mentioned. In general they are mixed with lime in the state of carbonate and sulphate, with magnesia in the state of carbonate, with iron in the state of oxide, or combined with sulphur, and with common salt. Almost all these compounds, or at least the bases of them, when exposed to a red heat, act chemically on one another, and on the silica and alumina. The precise nature of these actions has not been ascertained, the matter not having yet been investigated with the care that its importance deserves, but the following particulars may perhaps be considered as sufficiently authenticated.

At a moderate red heat, the iron, if neither lime nor magnesia be present, gives to the mass a more or less red colour. If lime be present in sufficient quantity, the colour given by the iron is cream-brown, passing into buff colour. If magnesia be also present—for I am not acquainted with any clay that contains magnesia without lime—the colour of the ware is brownish yellow, or the colour of unburnt ochre.

The carbonate of lime loses its carbonic acid, which escapes in the form of gas through the pores of the ware, provided the carbonate be thoroughly mixed with the other ingredients; but whenever a lump of it, even no bigger than a pea, occurs, a hole, reaching to the surface, is generally produced, probably by the rapid escape of the gas. Another effect produced by the lime is, that it combines with the alumina; and if the former be equal in quantity to the latter, it greatly diminishes, and, according to Bergman, almost entirely prevents the contraction of the alumina. At a more intense heat, the lime, the sand, and the alumina, melt together into an imperfect glass or slag, which, as it is formed, dissolves the oxide of iron, and thus acquires a bluish black, or greenish blue colour. The common salt is also decomposed; and the soda, which is its base, assists the action of the lime. The magnesia, sometimes at least, combines with sulphuric acid, which it gets partly from the iron pyrites mixed with the clay, and partly from the fuel when coal is made use of. This sulphate of magnesia it is which is occasionally found to cover the outer surface of new-built walls with a saline efflorescence, like hoar frost.

Having now stated the general principles on which the manufacture of earthenware depends, I proceed to give some account of the principal varieties of it. These I shall arrange in groups, characterized for the most part by the greater or less elaborateness of the

process employed in the preparation of the ingredients, and the beauty, the fineness, and commercial value of the ware itself.

The coarsest and most simple kind of earthenware is that employed in the walls, and as the covering of houses and other buildings; of this there are two kinds, bricks and tiles.

Till lately bricks appear to have been made in this country in a very rude manner. The clay was dug in the autumn, and exposed to the winter frost to mellow; it was then mixed or not with coal ashes, and tempered by being trodden by horses or men, and was afterwards moulded, without it being considered necessary to take out the stones. The bricks were burnt in kilns or in clamps: the former was the original mode, the latter having been resorted to from motives of economy. When clamps began to be employed I do not know, but they are mentioned in an act of parliament passed in 1726, and therefore were in use prior to that date.

It is chiefly, I believe entirely, from the alluvial deposits above the London clay, that bricks are made in the vicinity of the metropolis; and a section of these deposits generally presents the following series, such as would naturally result from a mixture of stones, and sand, and clay, and chalk, brought together by a torrent of water, and then allowed to subside. The lower part of the bed is gravel, mixed more or less with coarse sandy clay and pieces of chalk; this by degrees passes into what is technically called malm, which is a mixture of sand, comminuted chalk, and clay; and this graduates into the upper earth or strong clay, in which the clay is the prevailing or characterizing ingredient, the proportion of chalk being so small that the earth makes no sensible effervescence with acids. Bricks made of the upper earth, without any addition, are apt to crack in drying, and in burning they are very liable to warp, as well as to contract considerably in all their dimensions: on this account they cannot be used for the exterior of walls, and a greater number of such are required for any given quantity of work than of bricks, which, though made in the same mould, shrink less in the baking. The texture, however, of such bricks is compact, which makes them strong and durable. Bricks formed of this clay, whether mixed or unmixed, are called stocks: it was formerly used unwashed, and when the bricks were intended to be kiln-burnt, or flame-burnt, to use the technical word, no addition was made to the clay. If they were intended to be clamp-burnt, coal ash was mixed during the tempering. Of these and all other clamp-burnt bricks the builders distinguish two kinds, namely, the well-burnt ones from the interior, and the half-burnt ones, or place bricks, from the outside of the kiln.

At present the clay for stock bricks is separated with tolerable care from the pebbles, and its tendency to shrink and warp is diminished by the addition of chalk ground to the consistency of cream; but the calcareous earth increases the liability of the brick to vitrify in the burning, to counteract which, more sand is added. By these successive additions, however, the compactness of the texture is diminished, and such stock bricks approach nearly to the quality of

malm bricks. Sometimes, instead of chalk and sand, malm earth and ashes are added.

The calcareous clay, or malm earth, requires no addition of sand or chalk, but only of ashes. The bricks made of it differ from those made of the top earth, in being of a pale or liver brown colour, mixed more or less with yellow, which is an indication of magnesia; and such bricks are liable to effloresce. The hardest of the malm bricks are of a pale brown colour, and are known by the name of gray stocks; those next in hardness are called seconds, and are employed for fronts of the better kind of houses; the yellowest and softest are called cutters, from the facility with which they can be cut or rubbed down, and are used chiefly for turning the arches of windows. What I have said of top earth and malm earth must be understood, however, to refer to well characterized samples of these varieties, but, as might be expected, there are several brick fields that yield a material partaking more or less of the qualities of both, and therefore requiring corresponding modifications in its manufacture.

Brick earth is usually begun to be dug in September, that it may have the benefit of the frost in mellowing it and breaking it down. It is then washed by grinding with water, and passed through a grating in order to separate the stones; the mud runs into shallow pits, and here is to be mixed with ground chalk, if any is required: when it has become tolerably stiff by drying, coal-ash is added, usually in the proportion of one foot in depth of this latter, to three feet of clay; the ingredients are then to be well mixed, and, finally, the composition is to pass through the pug-mill, in order to complete the mixture and to temper it. The moulder stands at a table, and the tempered clay is brought to him in lumps of about seven or eight pounds; the mould is a box without top or bottom, nine and five-eighths inches long, four and three-fourths wide, and two and three-fourths deep; it lies on a table; a little sand is first sprinkled in, and then the lump of clay forcibly dashed into the mould, the workman at the same time rapidly working it by his fingers so as to make it completely close up to the corners; next he scrapes off with a wetted stick the superfluous clay, shakes the brick dexterously out of the mould on to a flat piece of board, on which it is carried to a place called the hacks; here it remains till dry enough to handle, and is then formed into open hollow walls, which are covered with straw to keep off the rain, where it dries gradually, and hardens till it is fit to be burnt. A raw brick weighs between six and seven pounds; when ready for the clamp it has lost about one pound of water by evaporation.* A first rate moulder has been known to deliver from 10,000 to 11,000 bricks in

* From some experiments made in France we learn the following particulars: A mould eight inches three lines long, four inches three lines broad, and two inches two lines thick, yielded bricks which on an average weighed, when first made, five pounds fourteen ounces. When dried and ready for the kiln they weighed four pounds eight ounces, having lost twenty-two ounces of water: nine ounces of this quantity evaporates in the first twenty-four hours, the other thirteen ounces require five or six weeks to evaporate. By burning, four ounces more of volatile matter is driven off; a well-burnt brick of the above dimensions

the course of a long summer's day, but the average produce is not more than half this number. If, however, the average daily produce of one moulder be estimated only at 5000 bricks, it is quite evident that the project of moulding them by expensive machinery, complicated, and therefore liable to want frequent repairs, cannot but be a most ruinous speculation.

The consumption of London is chiefly from the brick fields north of the Thames, at Stepney, Hackney, Tottenham, Kingsland, Hammersmith, Cowley, Acton, and Brentford. Those made at Grays Thurrock, Purfleet, and Sittingbourne, are of a very good quality, and a fine yellow colour; stone coloured ones are made near Ipswich, and have been largely employed in the outside walls of some of the new churches of the metropolis. There is a considerable exportation of bricks from London, many being sent to the West Indies, to Quebec, and to other colonies.

[TO BE CONTINUED.]

¶ *On the timber used for the Masts of Ships.*

Communicated to the Nautical Magazine by JOHN FINCHAM, Esq., Superintendent of the School of Naval Architecture in his Majesty's Dock Yard at Portsmouth.

The timber commonly used for masts is fir and pine, which are distinguished according to the character of their leaves and cones. Duhamel says, "that the leaves of the pines are slender and filaceous, more or less long, according to the species; two, three, or more, of these thin leaves proceeding from the same bud. It is this characteristic which distinguishes them from the fir, whose leaves are straight and separate, and all proceeding from one slight stem, similar to the teeth of a comb."

The timber used for masts is distinguished by mast makers by the name of the place from which it is imported; as the Norway and Riga firs, Canada red and white pines, &c.

The timber that possesses in the greatest degree the qualities best suited for masting is *pinus silvestris Genevensis vulgaris*, from the north of Europe, from the vast forests of Russia, Norway, and Po-

weighing four pounds four ounces. A fresh burnt brick when laid in water, absorbs about nine ounces; i. e. from one-seventh to one-eighth of its weight.

It appears, however, from experiments by M. Gallon, that the weight of bricks varies according to the care with which the clay is worked or tempered. Some clay was well worked, and then beaten for half an hour, on the morning of the next day it was again worked and beaten as before, and in the afternoon was again beaten for a quarter of an hour, and was then made into bricks. Another parcel of bricks was made of some of the same clay, treated in the usual manner. Both parcels were dried in the air for thirteen days, when it was found that those made by the former process weighed on an average five pounds eleven ounces each, while those made by the latter weighed five pounds seven ounces. Both kinds were burnt together for ten days, they underwent no relative change in bulk, but the weight of the former was five pounds six ounces, and of the latter five pounds two ounces.—*Arts et Métiers,* vol. iv.

land: that which is most esteemed is obtained from the forests of the Ukraine and Livonia; it is brought down the Dwina, and is commonly called Riga, on account of its being shipped from that port. In the same way, the Adriatic fir derives its name from being shipped in the Adriatic.

The great expense of Riga timber, and the difficulty there frequently is of obtaining it in time of war, have been inducements to Great Britain, as well as to other nations, to endeavour to have resources for masting their navy within their own states and colonies.

The different firs and pines, besides those of the north, used for masting the royal navy of Great Britain, and likewise to a great extent her commercial navy, are principally those from Canada, with some from Nova Scotia, and a few from Scotland. The timber from Canada consists chiefly of the white or yellow pine, *pinus strŏbus*, commonly called the Weymouth, or white masting pine; and the white, red, and black spruce, *pinus Canadensis*. The Scotch fir, *pinus silvestris*, is common to the Highlands of Scotland, as well as to Norway, Denmark, and Sweden.

The standing masts are generally made of the yellow, and topmast of the red pine; the white, red, and black spruce are but little used, except for small spars. Although the red and yellow pines do not possess, in an eminent degree, those good qualities which are found in those of the north, yet they have them to such an extent, especially the red pine, as qualifies them for the purposes for which they are employed. The Adriatic fir is frequently used for the masts of cutters and other small vessels, but does not possess particularly good qualities.

The woods that have been partially used for masts, are the Poon from the East Indies, and the cowrie. The poon has been used for masting ships built in India; the cowrie is brought from New Zealand, and has been used for small standing masts, and for topmasts as high as those of frigates, and even for a first rate. It possesses many of the most esteemed qualities for masting, and will probably be found to be a wood very eligible for this purpose. The cowrie resembles the pine in being coniferous, and containing a considerable quantity of resin, which exudes from it spontaneously.

The French, according to Forfait, M. le Ray, De Castries, and others, have recieved considerable supplies from Corsica, from the Pyrenees, and some from the Alps. To obtain supplies from the Pyrenees, they took immense pains to cut roads from the forests to the plains. They appear, likewise, to have received supplies from Catalonia, Savoy, from the departments of Mont Blanc, Puy de Dome, and Cantal. These firs, however, contain but little resinous substance; the heart is porous, the grain coarse; their flexibility is very trifling; and from a quick evaporation of their substances, they soon become dry, so that they break under very slight strains.

The pines from the Pyrenees are also inferior to those of the north. having but a small quantity of resinous substance in them, which soon evaporates; and from the difference of the soil, they are very variable in quality; many, however, are of a fine grain, and of considerable strength and elasticity, until they become dry. Those from Corsica,

pinus halepensis, of which species many grow on the Mediterranean side of France, Spain, Italy, Asia Minor, and Barbary, and likewise some on the south-east of France, have more resin in them, and are harder and considerably better than those from the Pyrenees.

The Turks obtain excellent firs from the shores of the Black Sea, from the Bosphorus to Sinope; they are commonly of the species denominated *pinus pinea* and *pinus laricis:* they are of better quality than is common to these species, and are little inferior to those of the north. These trees are plentiful near the Olympus, and in the interior of Asia Minor; the stem is straight, and grows to a considerable height and size. The Turks use them not only in masting, but likewise in the construction of the hull.

In selecting firs for masting, the climate, aspect, and soil in which they grow are to be considered. The state of the tree, when standing, may be known, in a great measure, from the luxuriance of its upper branches: if they be dead, or do not appear flourishing, the tree may likewise be considered on the decay.

To judge of the qualities of trees while standing, belongs more immediately to those employed in the forests; while the mast maker is left only to make his choice of the trees when felled, and whose attention is only drawn to their appearance as timber.

To become familiar with the different kinds and qualities of fir timber, requires considerable practice, and close observation, with likewise a proper acquaintance with some of the general appearances that distinguish these qualities. The firs most desirable are those with a fine and close grain, where the ligneous layers are closely blended together, and with the annual and concentric circles fine and firmly connected, and decreasing gradually from the heart to the sap. The nearer the concentric layers are to circles or ellipses, the less likely is the timber to be defective, as sudden swells are frequently caused by rindgalls. They are also generally strongly charged with resin, which is not only beneficial in giving strength and elasticity, but preserves the timber from insects, and prevents fermentation and decay. The colour should be of a clear or bright yellow, with a reddish cast alternately. The smell in the Riga, and other firs of this quality, should be strongly resinous, especially when they are exposed to the sun, or any other heat, or when their shavings are rubbed between the fingers. On the contrary, when the layers are separate, porous, or open, with tints of a pale red near the heart, and white spots intermixed, or of a dark red, with the resinous particles of a blackish colour, the timber is in a state of decay. Likewise, when the firs are cut transversely, and are of a colour not uniform, but interspersed with veins, and the smell is either entirely gone, or become fetid, they may be considered past their prime, and approaching to a state of decay. In yellow and red pines that have not the strong resinous smell, the degree of unsoundness is denoted by the offensiveness of the smell; and they will, in common with other firs, have alternate layers of a foxy brown or red colour, and will break out before the sharpest plane in being wrought.

[TO BE CONTINUED.]

¶ Popular Science.

No. I.

Selections from Letters on Natural Magic.

By Sir David Brewster.*

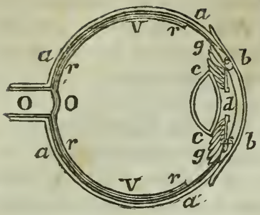
Illusions, &c. of the Eye.

Of all the organs by which we acquire a knowledge of external nature, the eye is the most remarkable and the most important. By our other senses the information we obtain is comparatively limited. The touch and the taste extend no further than the surface of our own bodies. The sense of smell is exercised within a very narrow sphere, and that of recognising sounds is limited to the distance at which we hear the bursting of a meteor, and the crash of a thunderbolt. But the eye enjoys a boundless range of observation. It takes cognizance, not only of other worlds belonging to the solar system, but of other systems of worlds infinitely removed into the immensity of space; and when aided by the telescope, the invention of human wisdom, it is able to discover the forms, the phenomena, and the movements of bodies whose distance is as inexpressible in language as it is inconceivable in thought.

While the human eye has been admired by ordinary observers for the beauty of its form, the power of its movements, and the variety of its expression, it has excited the wonder of philosophers by the exquisite mechanism of its interior, and its singular adaptation to the variety of purposes which it has to serve. The eyeball is nearly globular, and is about an inch in diameter. It is formed externally by a tough opaque membrane called the *sclerotic* coat, which forms the white of the eye, with the exception of a small circular portion in front called the *cornea.* This portion is perfectly transparent, and so tough in its nature as to afford a powerful resistance to external injury. Immediately within the cornea, and in contact with it, is the aqueous humour, a clear fluid, which occupies only a small part of front of the eye. Within this humour is the *iris*, a circular membrane with a hole in its centre, called the pupil. The colour of the eye resides in this membrane, which has the curious property of contracting and expanding so as to diminish or enlarge the pupil,—an effect which human ingenuity has not been able even to imitate. Behind the iris is suspended the *crystalline* lens in a fine transparent capsule, or bag, of the same form with itself. It is then succeeded by the *vitreous humour*, which resembles the transparent white of an egg, and fills up the rest of the eye. Behind the vitreous humour, there is spread out on the inside of the eyeball a fine delicate membrane, called the *retina*, which is an expansion of the *optic nerve*, entering the back of the eye, and communicating with the brain.

A front view and section through the axis of the eye, shown in the annexed figure, will convey a popular idea of its structure. It is, as it were, a small camera obscura, by means of which the pictures of external objects are painted on the retina, and, in a way of which we are ignorant, it conveys the impression of them to the brain.

* American edition, published by J. & J. Harper, New York.



This wonderful organ may be considered as the sentinel which guards the pass between the worlds of matter and of spirit, and through which all their communications are interchanged. The optic nerve is the channel by which the mind pursues the handwriting of nature on the retina, and through which it transfers to that material tablet its decisions and its creations. The eye is consequently the principal seat of the supernatural. When the indications of the marvellous are addressed to us through the ear, the mind may be startled without being deceived, and reason may succeed in suggesting some probable source of the illusion by which we have been alarmed: but when the eye in solitude sees before it the forms of life, fresh in their colours and vivid in their outline; when distant or departed friends are suddenly presented to its view; when visible bodies disappear and reappear without any intelligible cause; and when it beholds objects, whether real or imaginary, for whose presence no cause can be assigned, the conviction of supernatural agency becomes under ordinary circumstances unavoidable.

Hence it is not only an amusing but a useful occupation to acquire a knowledge of those causes which are capable of producing so strange a belief, whether it arises from the delusions which the mind practices upon itself, or from the dexterity and science of others. I shall therefore proceed to explain those illusions which have their origin in the eye, whether they are general, or only occasionally exhibited in particular persons, and under particular circumstances.

There are few persons aware that when they look with one eye, there is some particular object before them to which they are absolutely blind. If we look with the right eye this point is always about fifteen degrees to the right of the object which we are viewing, or to the right of the axis of the eye or the point of most distinct vision. If we look with the left eye the point is as far to the left. In order to be convinced of this curious fact, which was discovered by M. Mariotte, place two coloured wafers upon a sheet of white paper at the distance of three inches, and look at the left hand wafer with the right eye at the distance of about eleven or twelve inches, taking care to keep the eye straight above the wafer, and the line which joins the eyes parallel to the line which joins the wafers. When this is done, and the left eye closed, the right hand wafer will no longer be visible. The same effect will be produced if we close the right eye and look with the left eye at the right hand wafer. When we examine the retina to discover to what part of it this insensibility to light be-

longs, we find that the image of the invisible wafer has fallen on the base of the optic nerve, or the place where this nerve enters the eye, and expands itself to form the retina. This point is shown in the preceding figure by a convexity at the place where the nerve enters the eye.

But though light of ordinary intensity makes no impression upon this part of the eye, a very strong light does, and even when we use candles, or highly luminous bodies, in place of wafers, the body does not wholly disappear, but leaves behind a faint cloudy light, without, however, giving any thing like an image of the object from which the light proceeds.

When the objects are white wafers upon a black ground, the white wafer absolutely disappears, and the space which it covers appears to be completely black; and as the light which illuminates a landscape is not much different from that of a white wafer, we should expect, whether we use one or both eyes,* to see a black or a dark spot upon every landscape within fifteen degrees of the point which most particularly attracts our notice. The Divine Artificer, however, has not left his work thus imperfect. Though the base of the optic nerve is insensible to light that falls directly upon it, yet it has been made susceptible of receiving luminous impressions from the parts which surround it, and the consequence of this is, that when the wafer disappears, the spot which it occupied, in place of being black, has always the same colour as the ground upon which the wafer is laid, being white when the wafer is placed upon a white ground, and red when it is placed upon a red ground. This curious effect may be rudely illustrated by comparing the retina to a sheet of blotting paper, and the base of the optic nerve to a circular portion of it covered with a piece of sponge. If a shower falls upon the paper, the protected part will not be wetted by the rain which falls upon the sponge that covers it, but in a few seconds it will be as effectually wetted by the moisture which it absorbs from the wet paper with which it is surrounded. In like manner the insensible spot on the retina is stimulated by a borrowed light, and the apparent defect is so completely removed that its existence can be determined only by the experiment already described.

Of the same character, but far more general in its effects, and important in its consequences, is another illusion of the eye which presented itself to me several years ago. When the eye is steadily occupied in viewing any particular object, or when it takes a fixed direction while the mind is occupied with any engrossing topic of speculation or of grief, it suddenly loses sight of, or becomes blind to, objects seen indirectly, or upon which it is not fully directed. This takes place whether we use one or both eyes, and the object which disappears will reappear without any change in the position of the eye, while other objects will vanish and revive in succession without any apparent cause. If a sportsman, for example, is watching with intense interest the motions of one of his dogs, his companion, though

* When both eyes are open, the object whose image falls upon the insensible spot of the one eye is seen by the other, so that though it is not invisible, yet it will only be half as luminous, and therefore two dark spots ought to be seen.

seen with perfect clearness by indirect vision, will vanish, and the light of the heath, or of the sky, will close in upon the spot which he occupied.

In order to witness this illusion, put a little bit of white paper on a green cloth, and within three or four inches of it place a narrow strip of white paper. At the distance of twelve or eighteen inches, fix one eye steadily upon the little bit of white paper, and in a short time a part or even the whole of the strip of paper will vanish as if it had been removed from the green cloth. It will again reappear, and again vanish, the effect depending greatly on the steadiness with which the eye is kept fixed. This illusion takes place when both the eyes are open, though it is easier to observe it when one of them is closed. The same thing happens when the object is luminous. When a candle is thus seen by indirect vision, it never wholly disappears, but it spreads itself out into a cloudy mass, the centre of which is blue, encircled with a bright ring of yellow light.

The inability of the eye to preserve a sustained vision of objects seen obliquely, is curiously compensated by the greater sensibility of those parts of the eye that have this defect. The eye has the power of seeing objects with perfect distinctness, only when it is directed straight upon them; that is, all objects seen indirectly are seen indistinctly: but it is a curious circumstance, that when we wish to obtain a sight of a very faint star, such as one of the satellites of Saturn, we can see it most distinctly *by looking away from it*, and when the eye is turned full upon it, it immediately disappears.

Effects still more remarkable are produced in the eye when it views objects that are difficult to be seen from the small degree of light with which they happen to be illuminated. The imperfect view which we obtain of such objects forces us to fix the eye more steadily upon them; but the more exertion we make to ascertain what they are, the greater difficulties do we encounter to accomplish our object. The eye is actually thrown into a state of the most painful agitation; the object will swell and contract, and partly disappear, and it will again become visible when the eye has recovered from the delirium into which it has been thrown. This phenomena may be most distinctly seen when the objects in a room are illuminated with the feeble gleam of a fire almost extinguished; but it may be observed in daylight by the sportsman when he endeavours to mark upon the monotonous heath the particular spot where moor game has alighted. Availing himself of the slightest differencc of tint in the adjacent heath, he keeps his eye steadily fixed on it as he advances, but whenever the contrast of illumination is feeble, he will invariably lose sight of his mark, and if the retina is capable of taking it up, it is only to lose it a second time.

This illusion is likely to be most efficacious in the dark, when there is just sufficient light to render white objects faintly visible, and to persons who are either timid or credulous must prove a frequent source of alarm. Its influence too is greatly aided by another condition of the eye, into which it is thrown during partial darkness. The pupil expands nearly to the whole width of the iris in order to collect the feeble light which prevails; but it is demonstrable that in this state

the eye cannot accommodate itself to see near objects distinctly, so that the form of persons and things actually become more shadowy and confused when they come within the very distance at which we count upon obtaining the best view of them. These affections of the eye are, we are persuaded, very frequent causes of a particular class of apparitions which are seen at night by the young and ignorant. The spectres which are conjured up are always *white*, because no other colour can be seen, and they are either formed out of inanimate objects which reflect more light than others around them, or of animals or human beings whose colour, or change of place renders them more visible in the dark. When the eye dimly descries an inanimate object whose different parts reflect different degrees of light, its brighter parts may enable the spectator to keep up a continued view of it; but the disappearance and reappearance of its fainter parts, and the change of shape which ensues, will necessarily give it the semblance of a living form, and if it occupies a position which is unapproachable, and where animate objects cannot find their way, the mind will soon transfer to it a supernatural existence. In like manner a human figure shadowed forth in a feeble twilight may undergo similar changes, and after being distinctly seen while it is in a situation favourable for receiving and reflecting light, it may suddenly disappear in a position fully before, and within the reach of, the observer's eye; and if this evanescence takes place in a path or road where there was no sideway by which the figure could escape, it is not easy for an ordinary mind to efface the impression which it cannot fail to receive. Under such circumstances, we never think of distrusting an organ which we have never found to deceive us; and the truth of the maxim that "seeing is believing," is too universally admitted, and too deeply rooted in our nature, to admit, on any occasion, of a single exception.

In these observations we have supposed that the spectator bears along with him no fears or prejudices, and is a faithful interpreter of the phenomena presented to his senses; but if he is himself a believer in apparitions, and unwilling to receive an ocular demonstration of their reality, it is not difficult to conceive the picture which will be drawn when external objects are distorted and caricatured by the imperfect indications of his senses, and coloured with all the vivid hues of the imagination.

Accidental Colours.

In order to complete the history of the illusions which originate in the eye, it will be necessary to give some account of the phenomena called *ocular spectra* or *accidental colours*. If we cut a figure out of red paper, and placing it on a sheet of white paper, view it steadily for some seconds with one or both eyes fixed on a particular part of it, we shall observe the red colour to become less brilliant. If we then turn the eye from the red figure upon the white paper, we shall see a distinct *green* figure, which is the *spectrum*, or accidental colour of the red figure. With differently coloured figures we shall observe differently coloured spectra, as in the following table:—

Colour of the original figures.	Colour of the spectral figures.
Red,	Bluish green.
Orange,	Blue.
Yellow,	Indigo.
Green,	Reddish violet.
Blue,	Orange red.
Indigo,	Orange yellow.
Violet,	Yellow.
White,	Black.
Black,	White.

The last two of these experiments, viz. white and black figures, may be satisfactorily made by using a white medallion on a dark ground, and a black profile figure. The spectrum of the former will be found to be black, and that of the latter white.

These ocular spectra often show themselves without any effort on our part, and even without our knowledge. In a highly painted room illuminated by the sun, those parts of the furniture on which the sun does not directly fall, have always the opposite or accidental colour. If the sun shines through a chink in a *red* window curtain, its light will appear *green*, varying, as in the above table, with the colour of the curtain; and if we look at the image of a candle reflected from the water in a *blue* finger glass, it will appear *yellow*. Whenever, in short, the eye is affected with one prevailing colour, it sees at the same time the spectral or accidental colour, just as when a musical string is vibrating, the ear hears at the same time its fundamental and its harmonic sounds.

If the prevailing light is *white*, and *very strong*, the spectra which it produces are no longer black, but of various colours in succession. If we look at the sun, for example, when near the horizon, or when reflected from glass or water, so as to moderate its brilliancy, and keep the eye upon it steadily for a few seconds, we shall see, even for hours afterward, and whether the eye is open or shut, a spectre of the sun varying in its colours. At first, with the eye open, it is *brownish red* with a *sky-blue* border, and when the eye is shut, it is *green* with a *red* border. The *red* becomes more brilliant, and the *blue* more vivid, till the impression is gradually worn off; but even when they become very faint, they may be revived by a gentle pressure on the eyeball.

Duration of Impressions on the Retina.

It was found by a French philospoher, M. D'Arcet, that the impression of light continued on the retina about the eighth part of a second after the luminous body was withdrawn, and upon this principle Dr. Paris has constructed the pretty little instrument called *Thaumatrope*, or the *Wonder-turner*. It consists of a number of circular pieces of card, about two or three inches broad, which may be twirled round with great velocity by the application of the fore finger and thumb of each hand to pieces of silk string attached to opposite points of their circumference. On each side of the circular piece of card is painted part of a picture, or a part of a figure, in such a manner that

the two parts would form a group or a whole figure if we could see both sides at once. Harlequin, for example, is painted on one side, and Columbine on the other, so that by twirling round the card the two are seen at the same time in their usual mode of combination. The body of a Turk is drawn on one side, and his head on the reverse, and by the rotation of the card his head is replaced on his shoulders. The principle of this illusion may be extended to many other contrivances. Part of a sentence may be written on one side of a card and the rest on the reverse. Particular letters may be given on one side, and others upon the other, or even halves or parts of each letter may be put upon each side, or all these contrivances may be combined so that the sentiment which they express can be understood only when all the scattered parts are united by the revolution of the card.

Meteorological Observations for December, 1832.

Moon.	Days	Therm. Sun-rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	54°	44°	29.50	29.55	39°	S. W.	Blustering.	.2	Rain—flying clouds.
	2	22	32	30.05	30.05	18	NW. SE.	Calm.		Clear—cl'dy—light snow.
	3	32	34	29.70	29.60	34	NE.	do.	.50	Cloudy—rain.
	4	29	41	.60	.00	36	W. NE.	do.		Clear—cloudy.
	5	31	38	30.15	30.20	29	W. N.	do.		Clear—cloudy.
☺	6	32	42	.35	.30	30	S. SW.	Moderate.		Hazy—Light clouds.
	7	32	46	.30	.30	32	SSE. S.	Calm.	.14	Light cl'ds: hazy: rain in [night.
	8	40	45	.04	29.80	49	S. SW.	do.	1.60	Foggy—rain.
	9	46	42	29.30	.30	36	W.	Blustering.	.15	Fog—rain.
	10	32	40	.85	.90	32	W.	Moderate.		Clear day.
	11	30	42	30.00	.90	40	S. SSE.	do.	.40	Hazy—cloudy—r'n in n't
	12	41	43	29.45	.45	38	SW. W.	do.		Cloudy day.
	13	38	46	.90	.95	37	SE. S.	do.		Cloudy day.
☾	14	40	46	.95	.90	42	S.	do.		Cloudy day.
	15	42	40	.64	.64	38	NE.	do.	.92	Rainy day.
	16	35	43	.80	.84	38	W. S.	do.		Cloudy day.
	17	41	44	.45	.20	38	SE.	Blustering.	.83	Rainy day.
	18	37	41	.15	.15	37	W.	do.		Cloudy—flying clouds.
	19	31	32	.30	.33	15	W.	do.		Flying clouds—do.
⊗	20	20	26	.50	.55	8	W.	Moderate.		Clear day.
	21	15	24	.60	.60	6	W.	do.		Clear day.
	22	19	24	.80	.80	6	W.	do.		Light clouds—do.
	23	13	26	30.00	30 05	8	W.	Calm.		Clear day.
	24	17	34	.05	.10	17	S.	do.		Clear—light clouds.
	25	31	40	29.95	.00	26	SW.	do.		Cloudy—light clouds.
	26	30	33	30.10	.10	30	SE.	do.	.84	Drizzle—rain.
	27	35	42	29.70	29.65	39	S. W.	Moderate.		Heavy fog—clear.
	28	32	38	.90	30.00	24	W.	Blustering.		Clear day.
	29	28	36	.95	.00	19	W.	Moderate.		Cloudy—clear.
☽	30	20	33	30.50	.50	21	NE. S.	Calm.		Clear day.
	31	28	43	.40	.30	28	S. SW.	do.		Light clouds—clear.
	Mean	31.39	38.06	29.84	29.81	38.9			5.40	

	Thermometer.	Barometer.
Maximum height during the month,	54. on 1st.	30.50 on 30th.
Minimum do.	13. on 23d.	29.15 on 18th.
Mean do.	34.72	29.82

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

MARCH, 1833.

Proposed Standard of Weight and Measure. By John M. Patton, *of Milton, Pennsylvania.*

TO THE COMMITTEE ON PUBLICATIONS.

The following description of a proposed standard of weight and of measure, is at your disposal.

In the first place it will be necessary to suppose some *uniform temperature* established, at which all experiments on this subject are to be made.

Secondly, distilled water (at this established temperature,) may be considered of constant density, in vacuo.

Thirdly, from the invariable density of water, we may at all times and places ascertain the *relative* density of gold, mercury, &c. in such manner that the gold, mercury, &c. shall have a *constant relative density* to the distilled water. The words *relative density* are here used in preference to the term *specific gravity*, because the latter expression sometimes involves the idea of a pre-existing standard, which, in the present pursuit of our subject is inadmissible.

Fourthly, the elastic spring of atmospheric air is in proportion to the compressing force.

These things premised, I may now observe that if the atmosphere was, under all circumstances, of the same uniform density, the barometer would always stand at the same altitude, and hence a uniform standard would have been long since known. But the atmosphere

varies in density from many causes, and has, therefore, never been considered applicable to the establishing of a standard.

My object is to propose the means, at all times and places, of procuring a *partial atmosphere* whose density shall always be the same; and to depend on the *elasticity* of this partial atmosphere for the support of a column of mercury (of the uniform density,) at the same height. The length of this column to be taken as a *standard of measure*—subject, however, to the necessary equations, which will be hereafter mentioned.

For the purpose of pursuing this inquiry experimentally, an air pump and condensing apparatus, with suitable glass receivers of proper dimensions and strength; also, gold and mercury of the established relative densities, an accurately adjusted balance, and a glass tube of suitable length, will be required.

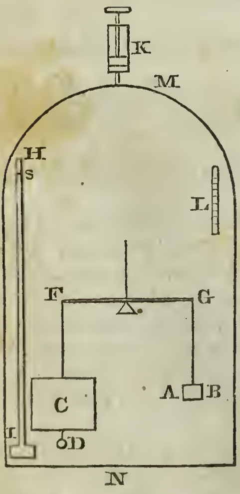
The articles mentioned being at hand, proceed in the following manner. Let any accurate cube of gold of the established relative density be made, of which let the line A B represent the side.

A ______________________________ B

Now let a hollow glass cube be accurately made, whose side shall be ten times A B, (or, any other established multiple of A B.)

The gold and hollow glass cubes must exactly balance in vacuo. (This glass cube we will call C.)

Let a gold weight be now made, of any shape which shall be exactly equal to one hundredth or one thousandth, or any other *established* proportion of the gold cube A B, by weight, (and call it D.)



In the annexed cut,
M N is a receiver of glass.
K, a forcing pump.
F G, an accurate balance.
L, a thermometer.
A B, the gold cube.
C, the glass cube.
D, the small gold weight.
H I, the glass tube, the lower end immersed in mercury.

This tube should be filled to the common height of the barometer in the same way that barometers are filled, leaving the space above a perfect vacuum.

Before the forcing pump is applied, the glass cube will preponderate, on account of the addition of the small weight D.

The air must now be condensed by means of the pump K, until the balance is accurately restored, which will take place in consequence of the less specific gravity of the glass cube, and then we shall have the insulated or *partial atmosphere* proposed.

The height of the mercury in the tube must now be ascertained at *s*.

Thus whatever cube of gold is first assumed, if we keep up the same relative proportions throughout, we shall always obtain a partial atmosphere of the same absolute density, and whose elasticity will consequently be the same, and hence capable of supporting the same column of mercury of the same density.

A standard formed on the foregoing principles, *will vary*,

First, in different latitudes, from the variation of gravity.

Secondly, In the same latitude, from the same cause, and on account of different elevations above the level of the sea.

And it may vary,

Thirdly, on account of the gravitating power of the moon.

Fourthly, it may vary, from different states of electricity pervading the atmosphere and *possibly* affecting the elasticity of our partial atmosphere.

These are the only causes, of which I am aware, that can possibly affect our standard. The two first are real, and must be equated; the last are imaginary, but may be examined.

I would propose, that a standard obtained by the means mentioned, at the equator, and on the level of the ocean, should be esteemed a *Universal Standard of Measure*, which standard is susceptible of accurate calculation, without experimenting at the place, as the experiment of any latitude can be justly equated to any other latitude; for this purpose a table of corrections should be constructed which might extend to every minute of latitude.

I am not critically conversant in calculations of this nature, which may be left for the qualified mathematician.

Our *experimental standard* being corrected for the latitude, may be called an *approximate standard*, and will be sufficiently near the truth to lay the foundation of calculations for further corrections on account of the different elevations at which the experiment may have been made, which needs no explanation.

The next inquiry is, what influence will the moon have on our mercurial standard?

On first view, I was led to believe that this influence would be considerable, seeing that the mercury is supported in the tube by the *elastic spring* of air, and *not* by a superincumbent column of the atmosphere acting by its gravity. Calculation, however, convinces me that this influence must be inconsiderable.

The mean distance of the moon from the centre of the earth is 1,267,200,000 feet, or about sixty semidiameters of the earth. Also the force of gravity at different distances, is inversely as the squares of the distances.

The radius of the earth is 21,000,000 feet; therefore, as the square of 1,267,200,000 is to the square of 21,000,000, so is the force of gravity at the surface of the earth, to the force of gravity at the distance of the moon, viz:—

1,605,795,840,000,000,000 : 441,000,000,000,000 : : 1 : 0.000274;

so that the force of gravity at the surface of the earth, is to the force of gravity at the moon, as 1 is to 0.000274; or, as 1,000,000 to 274. The magnitude of spherical bodies is as the cubes of their radii; but the mean radius of the moon is to the mean radius of the earth nearly as 3 : 11, and $3^3 : 11^3 :: 1 : 49$ nearly. The magnitude of the earth being nearly 49 times that of the moon.

The attractive force at equal distances is as the quantity of matter, but the attractive force of the earth at the moon is represented by 0.000274, consequently the attractive force of the moon at the earth will be one-forty-ninth of 0.000274, or 0.0000056.

Thus far I have considered the earth and moon of the same density; but the quantities of matter are as the densities, the bulk being the same; and the density of the earth is to the density of the moon as $4\frac{1}{2}$ to $5\frac{1}{2}$. Hence as the density of the earth $4\frac{1}{2}$ is to the density of the moon $5\frac{1}{2}$, so is the attractive force of the moon 0.0000056 to her true attractive force, viz. 4.5 : 5.5 : : 0.0000056 : 0.0000068. That is, the attractive force of the moon exerted on bodies on the earth's surface, amounts to $\frac{68}{10000000}$ of the force of gravity on the earth's surface; in other words, it would elevate the column of mercury in tube $\frac{68}{10000000}$ of the whole column.

If this force had been greater, it would have been necessary to equate it, to suit not only the latitude of the place of experiment, but also to suit the latitude of the moon.

In the language of Nicholson, "Newton calculated the effect of the *sun's* influence in this case, (the tides,) and found it about three times less than that of the moon." This language I consider equivocal. But in the case of our standard, to place the sun and moon as much as possible out of harm's way, let *all* our experiments be made when both these luminaries are on the meridian.

The next subject is, what will be the effect of electricity? Here analogy will furnish but little light, it will have to be referred to future experiment. There is, however, a further consideration which I have intentionally avoided, I mean the *moisture of air*, which would materially affect all experiments depending on the elasticity of air. Now to render as few instruments of observation necessary as possible, I propose to dispense with the hygrometer, believing that in its most perfect construction, it is subject to much error; and on this account let the atmospheric air, to be used in experiment, be always rendered as dry as possible, by keeping it for some days in close vessels, over a large quantity of quick lime. And now to return to the electricity; this fact we do know, that the *electric states of the atmosphere* are much influenced by the quantity of moisture which it may contain, but as we shall always use it in its most dry state, we shall probably have it free from danger, from the effects of electric influence.

General Observations.

A standard of measure being thus established, there is no difficulty in determining from it a standard of weight; the principle is altogether

consistent with the foregoing, and is too well known to require explanation.

On the subject of the absolute length of the standard of measure, I have ventured no opinion; the principles proposed being general, may, *by altering the relations*, produce various lengths.

In common parlance, a pressure of about two atmospheres, would produce a standard of about five feet, which I should suppose a very suitable length, and conveniently adapted to the principles of the experiment.

One observation more, and I close the subject.

A glass cube, of the size appropriate for this experiment, (as it must be hollow, and its magnitude not less than 1000 times that of the gold cube,) would, on account of its shape, be badly calculated to resist the pressure of a single atmosphere.

To obviate this difficulty, let a cube be made of any hard substance, and of the proper size. Then take a vessel of suitable size, open at top, into which pour mercury, or water, until it stands at any height; then immerse the cube altogether in the fluid and mark the height, withdraw the cube, and immerse another glass vessel (bottle shaped) until the mercury stands at the last mark, and also somewhere on the neck of the bottle; now let the neck of the bottle be cut off where the mercury marks, this bottle shaped vessel will of course be the same size as the cube, it must balance the gold cube, which may be effected by throwing into it any substance, and then closing it hermetically, to be used in place of the cube of glass.

Reinvention of Hare's Compound Blow-pipe.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—In looking over a recent number (No. 6, third series, December, 1832,) of the "London and Edinburgh Philosophical Magazine and Journal of Science," I was struck with a paragraph, in which Mr. J. O. N. Rutter claims to have *improved Clarke's blow-pipe*, by placing the oxygen and hydrogen gases in separate reservoirs, and allowing them to unite at the orifice of the blow-pipe: in other words, he has *reinvented Hare's blow-pipe as an improvement upon Clarke's.* That there may be no misapprehension, I give the paragraph in full.

"*Notice of a new Oxy-hydrogen Blow-pipe Apparatus. By J. O. N. Rutter.*"

"I have caused to be constructed by Messrs W. & S. Jones, 30 Holborn, an apparatus which is more simple, and at the same time more effective than either Clarke's or Gurney's blow-pipe; and it possesses the additional advantage of being *perfectly safe.* The most

timid may use this instrument without the slightest danger of an explosion. With ordinary precautions, such an occurrence is absolutely impossible.

"In Clarke's and Gurney's blow-pipes it is well known that the gases are mixed in their due proportions previously to charging* the respective reservoirs. In this consists their principal cause of insecurity, to obviate which I condense the gases in separate vessels, and they are not mixed until in a state of combustion.

"Excepting that the vessels I employ are larger than ordinary, I may describe my apparatus as consisting of two of Clarke's blow-pipes, fixed parallel to each other on a mahogany slab, the jets being inclined so as to form an angle of about five degrees, and separated by a partition one-fiftieth of an inch thick. The orifices of the jets are considerably larger than those commonly used.

"The dimensions of the vessels are as follows:—That for hydrogen (marked Hyd.) ten inches long by five wide, and four deep; that for oxygen (marked Oxy.) of half the capacity of the former, viz. ten inches long, two and a half wide, and four deep. It is important that the copper vessels be made very strong: this is the greatest difficulty I have had to contend with. With a nine inch syringe I can condense from 800 to 1000 cubic inches of hydrogen gas into the largest vessel, and about half that quantity of oxygen into the vessel appropriated for it. That there can be no necessity for safety-valves, safety-tubes, wire gauge, water, or oil, or mercurial chambers, must be apparent to every one whom the present communication may concern; these are consequently dispensed with The tubes which conduct the gas from the respective vessels have each two stop cocks to regulate the escape. A very little practice enables the operator to determine the quantity so as to produce the maximum of heat.

"The usual experiments as performed by the apparatus I have thus, I fear, imperfectly described, are, if I may be allowed the use of expression, *infinitely* more splendid and more impressive than can be effected by any other means with which I am acquainted. The lime experiment especially, is inconceivably brilliant, exhibiting a disc of pure white light, one and a half inches in diameter. With a piece of clock spring I have filled an area of three feet diameter with the most beautiful corruscations.

"The advantage of this apparatus is that, if† of sufficient capacity,‡ one or two charges will be sufficient for a course of illustrative experiments in a lecture room. There is not the slightest danger of explosion. It is more powerful and more striking in its effects than any other instrument.

"I shall have great pleasure in furnishing any further details that may be required. Might not vessels of sufficient strength and capacity be constructed, in which a store of gas could be kept at the most

* In the original, *changing;* which I take to be a typographical error.

† Omitted in the original.

‡ The word *that* is repeated here in the original.

important light-houses, to be used in thick weather, in furtherance of Lieut. Drummond's plan.

"Dr. Faraday has informed me that about the time that Clarke's blow-pipe was invented, an instrument somewhat similar to mine was shown him, and was, he believes, described in the Philosophical Magazine. But that instrument consisted of one vessel only, divided by a diaphragm. Hence there was no security against an explosive mixture forming in either of the chambers, through a defect in the metal."

Lymington, Hants, September 10, 1832.

That Mr. Faraday could have been ignorant of Dr. Hare's invention cannot be supposed, much less that he should have wilfully overlooked it on this occasion. It is much more easily believed that the *inventor* has misunderstood him, and that he meant distinctly to refer the latter to the account of the original method of using hydrogen and oxygen to produce intense heat, without any danger of explosion, republished in the 14th vol. of Tilloch's Philosophical Magazine, London, 1802. How the generally clear sighted editors of the Philosophical Magazine, have permitted the insertion, as new, of what was published thirty years ago in the journal of which theirs is a continuation, seems surprising: we trust that their next number will bring upon its pages a remark explaining and excusing what must have been an inadvertence.

Of the instrument and experiments of Professor Hare, Dr. Thomas Thomson, of the University of Glasgow, speaks thus.*

"When a mixture of oxygen and hydrogen gases is set on fire, they burn with very little light, but produce a most intense heat. This mixture was first employed as a blow pipe, by Dr. Hare, of Philadelphia, about the year 1800 or 1801, and he succeeded, by means of it, in fusing some of the most refractory mineral substances.† More lately it was revived by Dr. Clark, who, at the suggestion of Mr. Newman, introduced a mixture of the two gases into Brooke's blow-pipe, and condensed them, and then set fire to the mixture issuing out of a capillary tube. The results obtained by him, were nearly the same as those which had been already made known by Dr. Hare. I contrived an oxygen and hydrogen blow-pipe in the year 1801, and made many experiments on its powers; but as almost all my results had been anticipated by Dr. Hare, I never thought it worth while to give any of them to the public."

Dr. Thomson then gives a figure of the compound blow-pipe, of a form which is very much the same with that which is commonly used in this country. It is the most simple, though not the most scientific form of the instrument,‡ and I am disposed to think it really to be,

* Thomson's System of Chemistry, seventh edition, vol. i. p. 101.

† Ann. de Chim. xlv. 113.

‡ See Hare's Chemical Compendium, p. 77. The apparatus there described, is referred to in the description as being supplied with the gases by vessels which are *not even contiguous.*

what the author in the Philosophical Magazine asserts that it is, an improvement on Clarke's compound blow-pipe. The *improvement*, however, dates in 1801, having preceded, in point of time, the *original invention* some fifteen years, and the reinvention, in 1832, can be classed only with what your editor styles

MODERN ANTIQUES.

FRANKLIN INSTITUTE.

The Committee on Inventions, appointed by the Franklin Institute, for the promotion of the Mechanic Arts, to whom was referred the consideration of the several subjects annexed, present the following reports, viz:—

On a Portable percussion Cannon Lock, or substitute for Port Fire; and an improved Cannon Lock, denominated the Compression Cannon Lock, invented by Mr. J. Shaw, of Philadelphia,

REPORT, That they are of opinion that the portable percussion lock appears to be well adapted to the purpose of discharging cannon when a failure would occur either from the permanent lock, or any of the other modes of discharge, and think it a valuable improvement in gunnery.

The compression cannon lock, from its great simplicity, and apparent certainty of action, (in connexion with his priming tubes,) appears to be all that can be desired, and if there is no practical difficulty in the way, of which the committee are not aware, they consider it the best lock that has yet been introduced, there being but little liability to get out of repair, in consequence of not having to depend upon springs of any kind, and also the facility with which it may be either made or repaired.

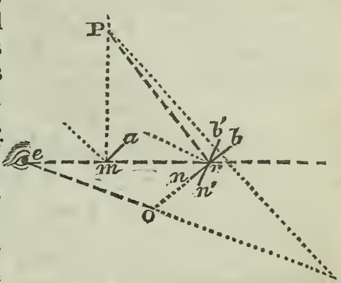
September 26, 1832.

On two reflecting instruments for measuring distances at a single observation; by Nathan Scholfield, of Montville, New London county, Connecticut.

The use of the sextant for measuring distances, by two observations at the opposite extremities of a base line, is well known. The two instruments now before the committee substitute for the measured base line and two observations, a base within the instrument and a single observation. The end to be accomplished is the measurement of the distance from the observer to any object. In principle the two instruments do not differ; the peculiar construction of each adapts it to a different use from the other, and what is gained in portability in one is lost in practical accuracy. Theoretically they are equally ingenious and correct. As a patent has been, or will be,

secured by the inventor, a brief exposition of the principle of the instruments, with special reference to the manner in which it is applied in one of them, is all that it would be proper to give at this time: this examination will show the grounds of the opinion which the committee gives in relation to the instruments.

The mirrors, *a* and *b* (see figure,) are placed in a wooden case; the first, *a*, is fixed at an angle of forty five degrees with the longitudinal axis of the tube which it enters, as far as that axis; the second, *b*, is moveable about an axis at *r*, and crosses the axis *er* of the case. There is an opening in the side of the tube in front of each mirror. When the instrument is properly placed, and the mirror *b* made parallel to *a*, the observer, in looking into the tube, sees reflected by the mirror *a*, an image of the object, the distance of which from this mirror is to be measured. When the image is made to appear on the edge, *m*, of the mirror, the line P*m* is, by the law of the reflexion of light, perpendicular to *en*, the axis of the instrument. The image of P of the other mirror, if seen at all, will appear at *o* not coinciding with *m*. By turning the mirror *b* about its axis the image will advance towards *r*, and will ultimately coincide with it; when the two images will be seen by the eye, at *e*, in the same line *er*. It may be easily shown that the angular motion of the mirror *b*, necessary to bring it into this new position *b′ n′*, will be half the angle at P. The distance *mr* is, then, the base of a right angled triangle of which one of the oblique angles, viz. P, is found, and hence the side *m*P becomes known.



Note referred to at the close of the report.

* The difference of distance corresponding to any change in the angle P, may be thus found:

Call the variation in the angle P, y, the distance m P, a, and mr, b. Suppose the angle P, to become $P - y$, and that then a becomes $a + x$, x denoting the increase of length of a, corresponding to a decrease, y, of the angle P.

By trigonometry

$$\tan. P = \frac{b}{a} \text{ and}$$

$$\tan. (P - y) = \frac{b}{a + x}\text{; but}$$

$$\tan. (P - y) = \frac{\tan. P - \tan. y}{1 + \tan. P \ . \ \tan. y}$$, or by substituting for tan. P and tan. $(P - y)$ their values found above

The mirror b, is turned by a long arm extending to near e, and which is moved by a tangent screw. The angular motion is thus measured on a radius of considerable extent. In the instrument pre-

$$\frac{b}{a+x} = \frac{\frac{b}{a} - \tan. y}{1 + \frac{b}{a} . \tan. y} \text{ or}$$

$$\frac{b}{a+x} = \frac{b - a . \tan. y}{a + b . \tan. y}, \text{ whence}$$

$$x = \frac{(a^2 + b^2) . \tan. y}{b - a . \tan. y}, \text{ or}$$

$$x = \frac{a^2 + b^2}{\frac{b}{\tan. y} - a}$$

If, as assumed above, $b = 5$, and $y = 1$, the general equation becomes

$$x = \frac{25 + a^2}{17241.4 - a}$$

$$\text{When } a = 10,\ x = \frac{125}{17231.4} = .007.$$

$$\text{For } a = 100,\ x = \frac{10{,}025}{17141.4} = .62$$

For $a = 1000$, $x = 61.6$, and for $a = 10{,}000$, $x = 13{,}809$; which is greater than the distance a.

By assuming a limit to the accuracy required, calculation will show how the instrument may be adapted to this limit when possible. For example, let the greatest inaccuracy allowed be one foot in 100, then b and y must be so adjusted that at the greatest distance for which the instrument is to be used $x = \frac{a}{100}$ Calling this value of a, a', we shall have,

$$.01\ a' = \frac{a'^2 + b^2}{\frac{b}{\tan. y} - a'}, \text{ or}$$

$$b^2 - \frac{.01\ a'}{\tan. y} . b = -1.01\ a'^2, \text{ an equation which must}$$

exist in order that the required accuracy may be attainable. To examine by it the machine already supposed, let us ascertain whether at 1000 feet, as the greatest distance at which it is to be used, the accuracy will be one foot in 100. In this case $a' = 1000$, b, as before, $= 5$, and $\tan. y = \tan. 1'$. Whence $b^2 = 25$, $\frac{b}{\tan y} = 17241.4$, $.01a' = 10$, and $1.01\ a'^2 = 1{,}010{,}000$. Substituting these values in the equation above, it requires

$25 - 172{,}414 = - 1{,}010{,}000$, the equation is not fulfilled and the machine does not come up to the requirement. It would be easy to determine values of y and b required for all possible degrees of accuracy, and thus by the possibility of making the half divisions accurate, and by the length

sented, for examination, to the committee, there is a scale of distances applied to the arm, so that the observation being completed, the distance mP, and not the angle measured, is read off. The committee consider that greater accuracy would be attained if equal divisions, and a vernier reading, were substituted for this scale, and the distances, corresponding to the different angles, given in a table.

When the distance to be measured is considerable, the base line afforded by these instruments is too small to give results of any accuracy, but within the limits of their powers, there are cases requiring rapidity of measurement, and not accuracy, in which the committee think these instruments will be found useful.

To ascertain the extent of this power it is only necessary to remark that the distance mP is the cotangent of the angle P to the radius mr, and that when mr is given, in the particular instrument, the variations of mP may be calculated for assumed changes in the angle P, or in half that angle, as measured by the motion of the arm which turns the mirror b. Assuming the distance between the mirrors to be five feet, the angular motion of the mirror b, from its position parallel to a, or the zero of the scale, will be for 1000 feet nearly $8' \, 35''$, and for 1100 feet $7' \, 50''$, a difference of $45''$ or three-fourths of a minute for a difference in 100 feet, or ten per cent. of the first distance. If we assume that by the divisions on the scale attached to the arm, the motion of the mirror may be correctly found to half minutes; then the distance between the mirrors being taken at five

which convenience might limit, to ascertain whether the machine could be constructed to give the required degree of accuracy.

The investigation may be made more general, thus; let $\frac{a}{n}$ express the required limit of accuracy at the greatest distance for which the instrument is to be used, then at that distance $x = \frac{a}{n}$, or calling, as before, the value of a, a',

$$\frac{a'}{n} = \frac{a'^2 + b^2}{\frac{b}{\tan. y} - a'} \text{ whence}$$

$$b^2 - \frac{a'}{n \tan. y} b = -\frac{a'^2}{n} - a'^2 \quad -a'^2 \left(1 + \frac{1}{n}\right)$$

$$b = \frac{a'}{2n \tan. y} \pm \sqrt{\frac{a'^2}{4 n^2 \tan.^2 y} - a'^2 \left(1 + \frac{1}{n}\right)}$$

$$b = a' \left(\frac{1 \pm \sqrt{1 - 4 n^2 \tan.^2 y \left(1 + \frac{1}{n}\right)}}{2n \tan. y} \right)$$

This equation is possible when $4n \tan.^2 y \, (n + 1) < 1$

feet, a change of half a minute would correspond at ten feet to .007 of a foot, at 100 feet to .62 of a foot, at 1000 feet (or .19 of a mile,) to 63 feet, and at 10,000 feet (1.9 mile,) the whole motion is but 51 seconds, and considerable variations would entirely escape detection.* (See note page 153.) The divisions, however, may be carried below the half minute.

Bibliographical Notice.

An elementary Treatise on Algebra, Theoretical and Practical, intended for the use of Students; by J. R. Young. First American edition, with additions and improvements by Samuel Ward, jr.

A treatise on algebra, bearing the above title, has lately appeared, and is now before the American public. On examining its table of contents, we find that it is not deficient in its list of subjects treated of. None of the books on algebra that have been published in this country appear to have pursued the subject farther; indeed most of them have stopped short of the limits which this author has prescribed to himself. He has placed the mark high—he has omitted no rule nor method which the judicious teacher could require to prepare his pupil for the higher branches of analysis.

We could point out a number of treatises on algebra which have been defective in this particular—treatises which give good instruction in the elements of algebra, and are quite sufficient for those who study this subject for the sake of saying they have studied algebra; yet leave the student perplexed when he attempts to study the calculus, or to apply his knowledge to useful scientific investigations. Being well pleased with the outline of the work, we come with good humour to the examination of its separate chapters. And, first, we would remark that the work bears the stamp of originality. Several of the methods of solving difficult questions are new and ingenious. Some of the theorems have been published in scientific journals, but have not hitherto found their way into any of the popular treatises.

The student who wishes to become acquainted with the science of algebra, as it exists at the present day, must study it in this book, for he can find it in no other which has issued from the American press. If he is familiar with scientific journals, or has at hand a library of the most modern European publications, and if he has taste and leisure to peruse them; if, moreover, he has judgment enough to select the useful and valuable methods of solution, to the neglect of all impracticable, obscure, and unprofitable speculations, he can dispense with the study of this book, and can from his own reading and investigation supply the defects of former treatises; if he does not possess all these means, and wishes to become a complete master of the subject, we advise him to study this work attentively, and we

pledge ourselves that he will not be disappointed. We will go farther, and pronounce our decided opinion that however excellent his talents may be, he will, if he study any other single treatise on algebra, be found, on trial of skill, to be inferior to the scholar who has faithfully studied this work.

There is another class of algebraists who do not wish to fathom the depths of the subject. They wish to be able to multiply together easy algebraic formulæ, to solve simple equations, especially if they do not contain too many fractional expressions, and consist of one unknown quantity connected with a few figures, and not perplexed with *literal* coefficients. They would be willing to study quadratic equations if all denominators and radical signs were previously exterminated.

To this class we hardly know what advice to give, though it is evident they stand most in need of advice. They are contented with little, and a little book would suffice for them. For such students it would be well to publish a small book containing some fifteen or twenty duodecimo pages.

And yet we fear that this plan would not be acceptable, for a thin book is easily seen through, and the poverty of its pages would betray the poverty of their acquirements.

This book was not written for them, still if they must study a full sized book, they cannot do better than to procure this, if the cost is not too great; for, first, they will study the best treatise extant on algebra; and who shall then say that they are not accomplished algebraists? And, secondly, they are not obliged to study all the work; and as we do not suppose this class of students to possess much judgment to select the best parts, we will here advise them to commence at the beginning and study as far as their leisure or their understanding permits; for our author has wisely arranged the rules in the order of difficulty like the steps of a ladder, one obstacle arising to view as soon as another is surmounted, and proceeding in a regular gradation to the end; the rules which are all important being placed first, and those less indispensable reserved for the close.

To conclude, we give our opinion that this is the best treatise on algebra extant. The author has embodied in it the improved methods invented during the last ten or fifteen years, and made known to the world through the scientific journals. He has not made a parade of any abstruse and useless formulæ, calculated to astonish, but not to instruct. He does not attempt to give long trains of abstract reasoning, raising new doubts, but leading to no conclusions. His illustrations are excellent, neither fatiguing by their length, nor perplexing by their conciseness; and the work is enriched with a copious list of examples for practice, many of them new, and all of them interesting, and well adapted to the rules to which they are appended.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN AUGUST, 1832.

With Remarks and Exemplifications, by the Editor.

1. For *Switches, or Turn-outs, for Rail-ways,* whereby the rail-way car, or wagon, is made to pass from one track of the rail-way to another, as occasion requires; William Howard, United States Civil Engineer, Baltimore, August 2.

(See specification.)

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2. For a *Churn;* Caleb C. Knowles, Fayette, Kennebeck county, Maine, August 2.

The common vertical churn is to be used, but the shaft, instead of working up and down, is to turn round, backwards and forwards. A frame is to be made to support the dasher shaft, vertically; on the top of the shaft is a small cog wheel, into which a segment wheel, moved by a lever, mashes, and gives the vibratory motion to the dasher shaft, the dashers being slats within the tub. Sometimes the vibratory motion is to be given by a crank attached to one of the uprights of the frame, a pitman extending from the crank to a pin on the dasher staff.

We should have thought that there was but little to claim in this affair, but the patentee has contrived to make much of it; he says,—"What I claim as my invention and improvements are the frame, the arrangement of the wheels in such a manner that the horizontal motion of the lever forward and back, turns them, and causes the dash to turn round in the cream or milk, one way, and then the other, thereby keeping it in motion; the application of the crank to procure the same motion; the perpendicular dash with floats, and a cog wheel at the upper end, and the general arrangement of the whole machinery for the purpose of making butter, as above described."

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3. For a *Spiral Pump;* Cotton Foss, Perry, Geauga county, Ohio, August 4.

This "spiral pump" is the well known screw of Archimedes; the patentee, it is true, does not pretend to claim the principle of this pump, but merely an improvement thereon; "by the extension of the arms the pump can be raised more perpendicularly without altering the wideness of the threads, and will raise twice the quantity of water, without the necessity of doubling the power."

The arms are pieces framed into the centre shaft in the manner of spokes, and are to serve as supports to the boards forming the spiral thread. The dimensions given, are, a shaft twenty inches in diameter, and sixteen feet long. The spiral groove formed round this, is to have a space of two feet between each turn. The arms or spokes supporting the spiral, are to be three feet eight inches long. The inclination to be given to the screw is to be such that the horizontal

surface of the water will extend from the top of one spiral, next the shaft, to the bottom of that next above it, on the rim. The screw is to be made to revolve by a bevel geared wheel at the upper end of the shaft. Something will be gained in point of friction by enlarging the dimensions, but not much; to raise double the quantity of water, must therefore require, very nearly, double power to be applied.

We do not perceive the novelty upon which the claim is founded, as, according to our understanding of the thing, it simply amounts to saying that "I make the screw of Archimedes larger in diameter than usual, and place it more vertical than it is ordinarily placed." Now we are not acquainted with any rule limiting the diameter, or the inclination of this instrument, the relationship which one must necessarily bear to the other having been well understood from the epoch of its invention to the present day.

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4. For an *Inclined Water Wheel;* Cotton Foss, Perry, Geauga county, Ohio, August 4.

The water wheel described in the specification of this patent, is intended for a tide and current wheel. It consists of a shaft inclined from the perpendicular in any required degree, and capable of having this inclination raised by sliding blocks, or beams, in which its gudgeons run. The floats, or buckets, are formed like oars, and are attached to arms forming radii with the shaft. The claim made is to "the inclined water wheel as herein described; also the moveable sill on which it stands, and the sliding beam which is moveable in the said plates."

The wheel is to be fixed in proper frame work by the water side, or it may be moored in the water, or otherwise placed, so as to answer the intended purpose. In what it is superior to numerous other tide and current wheels, we are not informed, nor are we able to discover; and, as at present impressed, should prefer the ordinary vertical wheel, made in the manner of the common undershot.

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5. For an improvement in *Percussion Fire Arms;* James B. Porter, Gerrard, Schuylkill county, Pennsylvania, August 4.

The contrivance presented to us in this patent consists of a mode of firing two or more charges in succession, without stopping to reload the piece. When there are to be two loads, there must be two nipples to receive the percussion caps, one in the usual place, and the other about two inches in advance of it. A load, with its ball, is to be rammed down, and is to extend nearly to the touch hole of the further cap; a second load is then to be rammed down in the same way as the former. The hammer is double, one part of it reaching over to this last cap, and the other strikes on that cap which is near the breech; this last hammer works upon a joint, and is capable of being moved out of the way. When the gun is to be fired, a cap is placed upon the further nipple, and the discharge made; a cap is then to be placed upon the other nipple, the secondary hammer brought down to

its place, and the second load discharged. The claim is to the described mode of effecting this object.

Percussion powder is rather an insinuating material, and, waiving all other objections, we think that the gunner would sometimes be saved the trouble and cost of placing a cap upon the second nipple, although he might need one upon his own, as there would be no small danger of bursting the gun by the explosion of its double charge. If it is designed to use this contrivance on fowling pieces, we believe that there are few sportsmen who would not prefer the double barrelled gun, even if the danger we have stated should not exist.

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6. For an improvement in the *Pegging Machine;* William B. Randall, Fayette, Kennebeck county, Maine, August 6.

The description and drawing of this machine are undoubtedly clear to the inventor, but they convey to us but a very confused notion of it; perhaps by much study and application they might enable us to invent a machine somewhat similar, but we should have first to learn all about former modes of procedure in this business, and as we have affairs of higher interest, to ourselves at least, which demand attention, we must, however reluctantly, leave our readers in the same state of darkness, as regards this pegging machine, in which we are involved.

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7. For a *Double Power Hydrostatic Oil Press;* Orestes Badger, and Orris Lull, Otsego, Otsego county, New York, August 9.

The general principle upon which this press operates, is that of Bramah's hydrostatic press, but the cylinder is placed horizontally, instead of vertically, and it has two pistons instead of one, the cylinder being open at both ends.

A strong frame is made, in the form of a trough; it may be formed altogether of iron, or of wood and iron combined; in the middle of this trough the cylinder is placed, with its two pistons leathered in the usual way. The forcing pumps for injecting water resemble those now in use; the water from them is injected into the middle of the cylinder, and acts equally upon each piston. The seeds or other articles to be pressed are placed in vessels properly constructed, one of which is put in at each end of the trough. When the pump is worked, the pistons operate equally upon these vessels, and press the contained oil from the seeds in each.

The specification gives a very full description of the apparatus, and closes with the following claim.

"The petitioners claim to be the inventors of the improvement of laying the cylinder horizontal, and of working the pistons out of both ends; and of the frame, and laying it also horizontal, and finally, of the whole construction of the frame, the pistons, and construction of the cylinder; the introduction of the water into the middle of the cylinder; the safety valves; and finally, the whole construction of the press, and application of it to the purposes of extracting oil from flax seed, and other vegetable substances. The petitioners do not claim

to be the inventors of the principle of creating a pressure by the injection of water into a cylinder, it having been used before for an upright press, with one piston rising upwards; but the petitioners do verily believe that they are, and claim to be, the inventors of the machine in its present shape, and the application of the same as described in the specification."

We apprehend from the title of a "double power hydrostatic oil press," that the patentees suppose they double their power by pressing at both ends; but whilst action and reaction are equal, such cannot be the case; an error of this kind is, however, one of very frequent occurrence; still, a little reflection must render it apparent, that when a given quantity of water is injected into this new press, it can move each of the two pistons to but one-half of the distance to which a single piston would be removed by it. Apart from this, however, we think the claim is much too broad; the employment of the two pistons we believe to be new, and whatever advantage may result from the use of them would, in this case, belong fairly to the patentees; but the placing the cylinder horizontally, would not, if new, alter the nature of the press; and it is not new; in Bramah's own manufactory, he has used his cylinder horizontally, having employed it instead of a screw to a vice, in which articles were to be held with great force. "The whole construction of the press," as used by the patentees, may with more truth be said to be old than new; for although the two pistons, and some other particulars named, might be legitimately claimed, the general construction is no further changed than was necessary to the position of the cylinder. We think that the common error of patentees, the claiming too much, has been manifestly committed in the present instance.

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8. For a *Current and Tide Water Wheel;* James Bennet, Vigo county, Indiana, August 10.

A water wheel with floats made in the usual way, is to have its gudgeons run in head blocks placed between uprights which admit of their sliding up and down by the aid of chains or racks, operated upon by suitable machinery. The contrivance has undoubtedly been made without a knowledge of what has been already done, as the whole is very inferior in point of arrangement to structures of a similar kind which have repeatedly been carried into effect, although with but little advantage. The specification does not pretend to claim any thing as new.

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9. For a *Brick Press;* David M. Crellis, Sandwich, Strafford county, New Hampshire, August 11.

This, like the pegging machine, described a page or two back, however good it may be, has its qualities hidden behind a thick veil of bad authorship, and we are very apprehensive that our best machinists would be puzzled in the attempt to make the instrument from the specification and drawing alone. Perhaps the model might remove the difficulty, but as this makes no part of the patent, we do

not resort to it for the information which we publish, being determined not to promote the prevailing error on this point. If the specification and drawing taken together do not make the invention known, they are essentially bad.

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10. For an improvement in *Saws;* Stephen Ustick, city of Washington, District of Columbia, August 11.

The proposed improvement in saws consists in giving to a certain portion of the teeth a form different from that which they usually receive, which teeth the patentee calls "side cutters." The other teeth of the saw, say five or six in succession, are to be of the ordinary shape. The side cutters, instead of being pointed, are round at their ends, and filed to a sharp edge; they are to be a little longer than the other teeth, and are to be set alternately on each side of the saw. It is intended that their cutting edges shall clear the sides of the stuff, and make smooth work; in order to this, they must be so set as to be perfectly parallel to the sides of the saw. The improvement is said to consist in the form of these rounding teeth, and in the setting them in the way described.

There are but few workmen who are able to sharpen and set a saw really well; it is in fact a very nice job to any one but the saw maker who is constantly employed at it. To sharpen and set a saw in the manner described, will be a task of still greater difficulty, and one, we think, that will rarely be undertaken, however well such a saw may be found to work when perfectly set. To keep the side cutters a little longer than the common teeth will not be a very easy thing, as their substance will be less. We might urge other objections, but they will be so obvious to the workman, as to deter him from leaving the beaten track.

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11. For an improvement in the *Mode of manufacturing Spoons out of Pewter, or other soft metal;* Charles Goodyear, city of Philadelphia, August 11.

Pewter spoons, as commonly made, are weak in the handle, and are very liable to break off near the bowl. To prevent this the patentee casts the handle and the bowl in separate moulds, the bowl, however, having about half an inch of the intended handle cast with it; this short piece is cast upon a wire, which, when removed, leaves a hole along the centre of it. The handle is cast with a flat piece of iron or steel wire extending its whole length, and projecting about half an inch from the end which is to join on to the bowl. This projecting piece is passed into the piece formerly mentioned, when the two are soldered together, and the juncture filed and finished in the usual way.

The claim is to the casting the spoon in two parts, and to the strengthening it by means of the flat pieces of iron or steel wire.

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12. For a *Plough;* John Moore, Cyntheana, Harrison county, Kentucky, August 17.

In this plough the mould board is to be entirely of wrought iron, and the share and mould board in one single piece. A piece of steel, welded upon the cutting edge, is to take the place of the ordinary coulter; this mode of construction forms one part of the claim; another consists in the mode of attaching the mould board and land side to the beam by means of a screw bolt, with a nut both above and below the beam, the object of which is to set the plough so as to take a greater or less hold in ploughing, &c. &c.

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13. For a *Plough;* George W. Palmer, Jefferson, Richland county, Ohio, August 17.

This plough is to be made in part of wood, in part of iron, and in part of steel; the iron being intended to strengthen the wood, and the steel to give all reasonable durability to the iron. In the picture this plough preserves the usual features of such articles, and whatever of invention there may be in it, the patentee claims none, leaving it to the sagacity of others to discover wherein it consists.

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14. For a *Plough;* John Weaver, Brownsville, Fayette county, Pennsylvania, August 17.

The plough as here presented to us certainly assumes the appearance of considerable novelty in form. The leading principle, the patentee says, is a means of moving the beam of a plough on the sheath or frame to which the shoe, share, and coulter, are attached. There is a considerable number of figures intended to illustrate this mode, which, as it is complex, could not be understood from verbal description.

It is observed that the same plough will not answer both in a light soil, and in stiff sward, and clayey land; the cause of which, the patentee claims, after much study, to have discovered; and it consists in "the different pressure of different soils on the mould board." This difficulty he obviates entirely by moving the beam, and thus regulating the pressure of the soil, in all its varieties on the mould board. "This he thinks the greatest discovery ever made in that useful implement."

There are ten points, or parts, particularly enumerated and claimed as new. The first of these is "the moving beam as applied to single and hill side ploughs;" and the other nine points consist, principally, in the individual parts by the combined action of which this is effected. Should it appear, however, that the moving beam is itself not new, and we have described many ploughs with moving beams, the nine accessories will scarcely support the superstructure.

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15. For a *Bedstead;* Henry Reisinger, York, York county, Pennsylvania, August 18.

This is intended for an invalid bedstead, and is so constructed that by the turning of a windlass, one end of it can be raised, or lowered. There is no novelty whatever in the means by which this is to be effected, whilst a number of movements and conveniences not at-

tempted in this bedstead, have, in addition to the mode of raising and lowering, been accomplished in others, several of which we have had occasion to notice. There is a drawing of the plan, but it is without the written references which are required by law.

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16. For improvements in *Water Wheels and Saw Mills;* Charles Forse, Boonville, Cooper county, Missouri, August 24.

The specification of this patent is a very formidable affair, extending over twenty-one pages of foolscap, of which we shall give but little more than the claims, referring those who are particularly interested upon the subject, to the patent office, as we could not furnish a sufficient illustration of it without the drawings.

"Claim. What I claim as new, and as my own discovery and invention in the above described water wheels, and saw mill, and for the use of which I ask an exclusive privilege, is as follows, viz.

"*The Flutter Wheel.* I claim as new, and as my discovery, the making use of flutter wheels of a less diameter, nearly one-third, than Evans' plan requires for a like head, or the practice of any millwright I have ever known. I also claim as new, and as my discovery, the location of said flutter wheel as before described, and also the formation of the chute and trunk as before described, and the covering of the wheel, the application and discharge of the water in such a manner that the wheel is capable of running under water."

"I claim as new, and as my discovery, that part of the gearing apparatus before described, which relates to the opening and shutting of the main water gate by the power of water, or other parts of the mill when in operation."

"I claim as new, and as my discovery, that part of the gearing apparatus before described, which relates to the opening and shutting of the tub wheel water gates, and to the running back works, as operated upon by water power or other parts of the mill."

"I claim as new, and as my discovery, that part of the gearing apparatus relating to the feeding hands, as is operated upon by water power, also by steam power or any other power."

"I claim as new, and as my discovery, that part of the gearing apparatus related to the setting out of the tail end of the log, and also for setting out the log for work at the opposite or head end, as operated upon by water, or other parts of the mill, or by steam power, or any other power."

"I claim as new, and as my discovery, that part of the gearing apparatus related to the fastening and loosening of the dogs, as operated upon by water power, steam, or other power."

We are informed that the improvements which form the subject of this patent have been in actual operation for a considerable length of time, and that they answer the intended purpose. The patentee avers, that a mill constructed upon his plan performs fifty per cent. more work than the ordinary mills.

Although we are not prepared to admit these statements to the full extent, we are convinced, from a careful examination of the model,

as well as of the specification and drawings, that the business of the saw mill is much facilitated by the operation of some parts of the machinery employed by the patentee.

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17. For a *Machine for Hulling and Cleaning Grain;* Orris Lull, Otsego, Otsego county, New York, August 25.

A cast iron cylinder is made of about three or four feet in length, and from twenty to twenty-four inches in diameter; the inside of it is to have angular ridges running from end to end, so formed that a transverse section would exhibit an appearance something like saw teeth. This cylinder is to be supported horizontally upon a suitable frame, and is to have heads of wood or iron, secured to flanches prepared for that purpose. Within this cylinder beaters are made to revolve, making six or eight hundred revolutions in a minute. The beaters consist of plates of iron set edgewise; they may be six in number, are sustained by heads fixed upon a revolving shaft, and are set spirally, so as to deviate, in their whole length, about two inches from parallelism with the axis; they stand at the distance of about an inch from the inner surface of the cylinder. The grain is introduced through an opening at one end, and falls out at a small opening on the lower side of the cylinder at its opposite end. At this end there is another opening through the head of the outer cylinder, near its upper side, through which the smut and other dirt is blown, it being enclosed by a trunk which conducts the dirt away.

The beaters serve to throw the grain perpetually against the ridges within the cylinder, whilst by their spiral form they gradually carry it forward, and at the same time create a wind by which the dirt and chaff are discharged.

The claim is to the cast iron horizontal cylinder, and the revolving iron spiral beater.

The machine appears to be well calculated for the intended purpose, but the directions given for its construction, and the form in which the claim is made, would seem to limit the inventor within very narrow bounds.

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18. For *Diaphoretic or Sweating Powders;* Horton Howard, Columbus, Franklin county, Ohio, August 25.

These powders are to be employed in cases of slight indisposition, where it is desirable to induce perspiration. They are prepared as follows:—

Butterfly root, (*Asclepias Tubarosa,*)	1 pound.
Bark of bayberry root (*Myrica Cerifera,*)	1 "
Ginger,	1 "
Bark of sassafras root, (*Laurus Sassafras,*)	4 ounces.
Colic root, (*Liatris Dubia,*)	4 "
Cloves and cayenne, each	2 "

These materials are to be finely pulverized and sifted; the dose prescribed for an adult is a tea-spoonful in hot water, with sugar, if preferred.

We are informed that this combination of stimulants, with tonics, increases the vital force, whilst it gives tone to the organs.

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19. For a *Bitter Tonic;* Horton Howard, Columbus, Franklin county, Ohio, August 25.

The recipe is—

Poplar bark, (*Populus Trepida,*)	1 pound.
Root of golden seal, (*Hydrastus Canadensis,*)	1 "
Bark of the root of bayberry, (*Myrica Cerifera,*)	1 "
Root of American columbo, (*Fracera Verticillata,*)	1 "
Cloves and capsicum, each	6 ounces.
Loaf sugar,	4 pounds.

These are to be pulverized, mixed, and given in water, a tea-spoonful being a dose.

To render the bitters laxative, a pound of bitter root, (*Apocynum Androsaemifolium,*) is to be added, with a proportionate increase of the cloves, capsicum, and sugar.

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20. For an *Astringant Tonic;* Horton Howard, Columbus, Franklin county, Ohio, August 25.

This medicine is to be employed in relaxations of the intestines, in hæmorrages, in canker, ulcers, putrid disorders, and fevers, but not when attended by costiveness, thirst, and much heat.

Brith root, (*Trillium Catifolium;*) plurisy root, (*Asclepias Tuborosa;*) Bark of the root of bayberry, (*Myrica Cerefera;*) inner bark of hemlock, (*Pinus Canadensis;*) are to be taken in equal parts; when pulverized and mixed, an ounce of the compound powder is to be steeped in a pint and a half of water. The dose is to be half a teacupful, with the addition of from one-half to a whole tea-spoonful of cayenne. In ordinary cases it may be taken three times a day; but in diarrhœa, &c. more frequently.

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21. For *Compound Tincture of Myrrh;* Horton Howard, Columbus, Franklin county, Ohio, August 25.

The recipe is—

Myrrh,	12 ounces.
Capsicum, (*Annuum,*)	2 "
Balsam of fir, (*Pinus Balsamea,*)	1 "
Nutmegs,	½ "
Brandy,	1 gallon.

Pulverize the solid articles, and steep them in the brandy for ten days, shaking frequently, and strain.

This, we are informed, is a very powerful antiseptic, and should be taken in all cases where internal mortification is apprehended, and in putrid diseases. It is also to be administered for worms, pains in the stomach, colic, headach, &c. &c. Dose, from one to four tea-spoonsful. It is also to be employed to bathe fresh wounds, and to be rubbed on the parts affected by rheumatism, or other obstinate pains.

22. For *Antispasmodic Tincture;* Horton Howard, Columbus, Franklin county, Ohio, August 25.

To prepare this tincture, take

Tincture of lobelia seeds, (*Lobelia Inflata*,)	1 pint.
Tincture of capsicum, (*Capsicum Annuum*,)	1 "
Nervine tincture,	3 gills.

Of these, when mixed, the dose is from half a tea-spoonful, to a table-spoonful.

It is to be used not only in cases of fits, spasms, &c. but in *all violent attacks of disease;* and in cases of apparent death from hanging, drowning, lightning, &c.

The tincture of lobelia seeds is to be prepared by digesting four and a half ounces of the seeds in a pint of alcohol for ten days. The tincture of capsicum, in the same way, using the same proportions. The nervine tincture by taking a powder composed of four ounces of lady's slipper, (*Cyprependium Luteum*,) of ginseng, (*Panax Qunquafolium*,) two ounces; with two nutmegs, and steeping it for ten days in alcohol, or brandy; to this, when strained, an ounce of essence of anine is to be added; this essence may be formed by mixing two ounces of the oil of anine in a pint of alcohol.

The patentee, in the five preceding patents, has almost given us a vegetable pharmacopœia, upon which we think it unnecessary to offer many remarks. Most of the medicines are good, if administered at the right time, and the same may be said of nearly all quack medicines, even those among them which are virulent poisons. There is nothing new, however, in either of them, excepting the exact proportions given in the recipe, and the patentee can secure nothing but the right of mixing them in the precise quantities indicated; this, to him, it is true, is a point of little or no importance; if he can contrive to make them popular they will sell, and he will make money by them; and this, of course, is the motive for procuring patents for them.

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23. For *Raising Water from the Interior of the Earth;* Levi Disbrow, and John L. Sullivan, city of New York, August 28.

(See description with specification.)

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24. For a *Machine for Hulling, Cleaning, and Polishing Barley, Rice, Broom Corn, &c.;* Theodore F. Strong, and Marcus T. Moody, Northampton, Hampshire county, Massachusetts, August 29.

Two disks are to be made in the form of mill stones, and are to operate in the same way; the upper one is to be of cast iron, to give it weight, but it is to be faced on the lower side with wood. The lower is to be of wood entirely. These disks are to be faced with strong card teeth, set in leather, or other elastic substance, and the grain to be hulled, &c. is supplied as to ordinary mill stones. From between these it passes into a winnowing machine, where the chaff and dirt are blown off, and the clean grain is conducted by a trough

through the eye of the upper of another pair of disks similar to the former, but faced with finer materials, as with bristles, hair, or dog-fish skin; after which it passes into a second winnowing machine, which completes the operation.

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25. For a *Portable Cooking Stove;* Stephen J. Gold, Cornwall county, Connecticut, August 29.

The claim made by this inventor is to what he calls "the diamond form of the stove, and the portable oven in two parts, to be used on this stove, or any other, as a dark oven." There does not, however, appear to be any thing in it, either in form or substance, worthy of particular notice, or commendation. The stove part is similar to most other cast or sheet iron stoves, and it has an opening through the top on which to place a pot or kettle. The top plate of the stove extends back of the main body, is double, and has three perforations in it, for skillets, pots, &c. and these four openings give to the outline of the top, the "diamond form" which constitutes the first claim. The "portable oven" is a box, shutting up, which may be placed over the three back openings, instead of the other utensils. There is a flue at the back end to carry off the smoke.

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26. For an improvement in the mode of *Preparing Fomentations used in cases of Sickness;* Timothy L. Jennison, Cambridge, Middlesex county, Massachusetts, August 30.

The main apparatus, or implement to be employed, the patentee denominates a *foveat*, which is to be substituted for the woollen, or other cloths, generally used in fomenting with decoctions of aromatic herbs, or other articles. The foveat is to be made of silk, cotton, linen, or other suitable cloth, and may be about half a yard square. Two pieces may first have lambs-wool batting quilted in between them; a similar piece laid upon this is then to be run, or stitched to it in the manner of the old fashioned housewife, leaving parallel spaces which would admit a round stick of an inch in diameter. The stitching is to be done in double rows, leaving a space of a third of an inch between each of the larger cavities. These large cavities are to be stuffed with the aromatic herbs, &c. by means of a funnel and rod, prepared for the purpose. When thus prepared it is to be dipped into boiling water, and then placed between two boards, which are hinged together at one edge, and is called a compressor; between these it is to be squeezed sufficiently dry, and then applied to its intended purpose. The whole apparatus is claimed as new.

The specification contains remarks upon the mode pursued "during the past century," and upon the great superiority of this apparatus and procedure, with particular directions for its use, which we do not think it necessary to copy. We do not dispute the goodness of the contrivance, but its employment will be principally confined to hospitals, and other institutions of a similar character, from which we do not expect, and scarcely wish, that the patentee should realize

a fortune. Such establishments as these give freely, and should freely receive.

LIST OF AMERICAN PATENTS WHICH ISSUED IN SEPTEMBER, 1832.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the mode of *Sizing Paper by Machinery;* John Ames, Springfield, Hampden county, Massachusetts, September 1.

(See specification.)

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2. For a *Pulp Dresser,* for dressing pulp in the manufacture of paper; John Ames, Springfield, Hampden county, Massachusetts, September 1.

(See specification.)

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3. For a *Wedge Press;* Oliver Perkins, Oxford, Oxford county, Maine, September 1.

This press, we are told, is to be used for pressing cloth, paper, books, spermaceti, &c. &c. or for raising pondrous bodies, as the extraction of stumps, &c. Upon the follower of the press there is a friction roller, the gudgeons of which work in boxes on the upper side of the said follower. An iron shaft crosses the press above the follower, extending from cheek to cheek, and turning upon gudgeons; one of these gudgeons passes through the cheek, and carries a toothed wheel; a pinion taking into this toothed wheel, and turned by a crank, gives the required revolution to the shaft. A wedge is to be made, the thickness of which at its back, should be equal to the intended descent of the follower, and its length must be proportioned to its thickness. This wedge is to pass in between the friction roller upon the follower, and the iron shaft, which forms the antagonist roller. Two chains, one on each side of the wedge, are to be attached by one edge to the wedge, and by the other to the iron shaft, when by turning the crank upon the pinion, the wedge will be drawn in between the rollers, and force the follower down.

Inclined timbers are placed to support the wedge on each side, acting as rail-ways to it; the wedge having truck rollers on them which rest upon the ways.

There is no claim made, the whole arrangement, we suppose, being considered as new.

A wedge drawn in, in this way, will certainly offer much less resistance from friction, than the screw; the chain winding upon a shaft, however, seems to us to be an incommodious way of drawing in the wedge. A rack and pinion we should think preferable. The method proposed is the same in principle with that of the press having

one or two eccentric rollers turned by a wheel and pinion; but the friction in this case is much less than that of the wedge with its chains, and, besides this, there is no wedge in the way.

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4. For an improvement in the *Reacting Water Wheel;* Geo. W. Henderson, and Joseph Russell, Wilburn, Somerset county, Maine, September 2.

The form of this water wheel is that patented by Mr. Wing, and described vol. vii. p. 86. This wheel, however, in its general principle and construction, has been more than once described, although imperfectly, in previous specifications. One of the present patentees, Mr. Geo. W. Henderson, and a Mr. John E. Cayford, obtained a patent for a reaction wheel with an open head, running against the bottom of a penstock, on the 14th of April, 1830. This, however, was specially described as not having the floats to lap over each other; each, if there were six, being one-sixth of the circumference of the wheel in length, whilst in Wing's there is a special claim to their lapping over each other. The only novelty in either case must be special, as the general construction is much older than either of the patents. These remarks may appear to be somewhat irrelevant, but they are not so, as they apply to existing feelings, and clashing interests among several different patentees, respecting which we have received divers appeals. Patentees seem very apt to imagine that those parts of a machine which are old do, in fact, belong to them merely because they have added some new feature to it; but should they go into court, this lesson will soon be placed in their hands, and they will not be allowed to skip over it.

The main claim of the present patent is the making the floats adjustable, for which purpose they are cast in separate pieces, and a pin, or gudgeon, is cast on each edge of each of the floats, which pins pass into corresponding holes in the rims; a screw and nut is used to fix them in the required position. This adjustment of the floats, by which the openings are enlarged or diminished, the patentees deem to be a great improvement, as by its means the flow of water can be lessened, when part of the machinery is put out of gear, or increased when more is added.

That considerable advantage may be derived from this adjustment, we do not doubt, although the theory of the patentees, that "the power of a reacting wheel is in proportion to the quantity of water discharged," is one which we cannot admit as true. If they open their buckets so as to make them nearly radii to the wheel, they will soon abandon this opinion. To have the maximum effect, the water must be delivered nearly tangentically, and if the floats are opened so as to deliver it otherwise, there will be a proportionate loss of power, and a consequent waste of water. We think that all the advantage derived from lessening the apertures in the present wheel, would be obtained by closing a certain number of openings in the wheel with fixed floats, as used by Mr. Wing.

To prevent the necessity for the *lighter* as used by Wing, the pa-

tentees say that the water is to rest upon the bottom of the floom, or cistern, " which removes the cause of the gudgeons wearing down."

The claim is to the " making the reacting water wheel alterable, and open, for the water to rest on a plane or bottom of a floom, or cistern, instead of the wheel."

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5. For a *Corn Sheller;* Christian Thomas, Conestoga, Lancaster county, Pennsylvania, September 3.

This is certainly a new, if not an improved, form of the corn sheller. A plank, about eighteen inches long, and a foot wide, is fixed so as to slide up and down in grooves made in two uprights; on one face of this plank a cast iron plate is screwed, which is grooved across from side to side, the grooves running somewhat diagonally; a cast iron cylinder, about four inches in diameter, and grooved from end to end, is fixed so as to turn upon gudgeons in front of the slider. The slider is to be worked up and down by means of a lever attached to the back of it by a jointed rod, the lever at the same time working a segment which causes the iron cylinder to revolve as the slider descends. The corn to be shelled is placed in the space between the iron roller and the slider, a small intermediate roller supporting the cob, which rolls off, over the top of the slider, when it is down at its lowest point.

The inventor, we presume, wanted a patent more than the public needed a corn sheller, as those already in use are, at least, as perfect in their operation as this new one can be, and will shell corn more quickly than one in which a slider must travel the distance of three feet for every ear that is shelled.

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6. For a *Water Wheel for Propelling Mills, Boats, and other Machinery;* Davidson Myers, Benton, Scott county, Missouri, September 3.

This consists of endless chains passing over rollers at each end of a frame, and carrying buckets, or floats, horizontally through the water, in a way which has been often tried, and which was in the beginning, is now, and ever shall be, found good for nothing.

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7. For an *Improvement upon the Rail-way Car Gold Riddle;* Oscar Willis, Burke county, North Carolina, September 5.

The rail-way car gold riddle, is described in a former number. The improvement now patented consists in suspending a riddle by four chains, attached above to proper frame work. The bottom of the riddle is to be of sheet iron, and perforated with numerous holes. Below the riddle is a hopper into which the siftings and water pass, and from which it falls into a ripple, furnished with ledges, in the usual manner. The riddle, by being swung backward and forward, gives, it is said, a peculiar action, which is similar to that of the "rail-way car gold riddle," upon the inclined planes.

8. For a *Rotary Grate and Floor, for Burning Anthracite Coal;* Eliphalet Nott, Schenectady, state of New York. First patented March 23d, 1826. Surrendered, cancelled and reissued upon an amended specification, September 17, 1832.

The patentee states that he has discovered that the ashes which attach themselves to the lower surface of the lower stratum of anthracite coal, or other fuel, can, to a considerable extent, be detached therefrom by means of a revolving grate; and that he has also discovered that the bars of grates last longer, the thinner they are, and that they break less frequently when they are connected together; he has been thereby led to the construction of his rotary grate, which forms the subject of this patent.

The rotary grate may consist of circular cast iron flat rings, which may be about an inch in width, and three-eighths of an inch in thickness. Upon one of the flat sides of each of these, small projecting knobs may be cast, which serve to keep the rings apart, and to regulate their distance from each other. These rings have arms attaching them to a centre, which is perforated to receive an axis by which they are all connected together. Rods may also pass through their rims for the same purpose. These rings are to be put together in such numbers as shall form a cylinder equal in length to that of the chamber in which the fire is to be made, and must be of such diameter as shall nearly fill its capacity in depth. The axis is to pass through the wall of the fire chamber, and is to receive a crank, or handle, by which it may be turned. The fuel is to be placed above this revolving cylindrical cage, or grate, and when it is desirable to remove the ashes, the grate is made to revolve a short distance in one, and then in the opposite direction, by means of the handle, or crank.

Instead of making the rings entire, they sometimes form segments only, say of about two-thirds, of a circle. When these are put together in the manner described, they constitute a longitudinal segment of a cylinder; the continuous part of the cylinder is to support the fire, in the way before described, and the ashes are also to be discharged by vibrating it, as with the entire cylinder; but it is likewise used to discharge the whole of the fuel, when required, and to drop it into the ash pit. This is effected by turning it round so that the side where the rings are not continued, comes under the fuel, which then falls into it, as into a basket; by then turning it round so that this open side of the cylindrical segment may be over the ash pit, the fuel is discharged.

Some variations of form and construction are described by the patentee, but the foregoing exhibits the leading feature of the invention, which will further appear by the claim, which is as follows:—

"I claim as my improvement the rotary grate and floor aforesaid, when employed in the evolution and management of heat, whatever the construction thereof, or however the same may be adjusted.

"In like manner I claim the full length horizontal axis aforesaid, (irrespective of its connexion with the grate aforesaid,) together with its adjustment in a chamber of combustion for rotary motion; should it be, as it admits of being, so adjusted by itself in the floor of such

a chamber, for the purpose of sustaining the fuel, or detaching ashes therefrom, or passing down the same when detached.

"In like manner, I claim the combination of the said rotary grate with said axis, and the adjustment of the two as connected in a chamber of combustion as aforesaid; together with the uses thereof when so combined, as the same are hereinbefore set forth; together with such other uses as said instrument may be applied to hereafter, in the evolution or management of heat."

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9. For improvements in the *Anthracite Coal Stove*, rendering combustion therein more uniform, and more intense, by the uniform supply of coal and air which have been previously heated; Eliphalet Nott, Schenectady, State of New York. First patented March 26th, 1828. Surrendered, cancelled, and reissued upon an amended specification, September 17, 1832.

This stove is generally made of cast iron; it may be round, but a square form is preferred. The stove is to be lined with fire brick, and in one, the chamber of which measures eight inches on the side, the whole height may be about thirty-three inches. A grate may be placed in it at about seven inches from the ash pit, and the part above this forms "the chamber of combustion," and a receptacle for fuel which is heating, but not undergoing combustion.

Instead of the grate commonly used in such stoves, the rotary grate, described in the last article, may be employed to greater advantage. The part below this grate forms the ash pit, and is also the chamber in which the air is to be heated, preparatory to its entering among the fuel; the ash pit may be furnished with a valve. In this part we do not discover any new provision for heating the air, as its construction appears to be precisely the same as that of numerous other stoves; there may, however, be something which we have overlooked.

The chamber, above the grate, is divided into two parts by a vertical partition, which descends from the top, to the distance, probably, of ten inches or a foot. This partition divides the upper chamber into two unequal parts; it may stand at about two inches from the back lining of the stove, and if it is itself two inches thick, it will, of course, leave a compartment in front of four inches by eight. The back space forms the flue, which is surmounted by a suitable pipe, whilst the front forms the reservoir for extra fuel. This part has a cover, which is to be lifted off for the supply of fresh fuel.

Suppose the whole of the chamber, with the exception of the flue, to be filled with fuel, and the fire lighted; the draft of air will extend no higher than to the lower part of the vertical partition, and rapid combustion will thus be limited to the fuel in the lower part of the chamber; ignition, however, will extend to a still greater height, and the whole of the spare fuel will be heated by radiation, and the ascent of heated air. The quantity of fuel requisite for the whole day may be thus supplied at once. Besides the cover, before mentioned, a plate of iron half an inch thick, and fitting the spare fuel chamber,

but so loosely as to slide down in it, is placed upon the fuel; this is called a follower.

The front plate of the stove is generally perforated, the opening being opposite to the lower part of the vertical portion. This opening has a lattice-work door, fitting closely, the lattices being covered by lamina of mica, (isinglass,) which excludes the air, but allows the fire to be seen.

When it is wished to apply the heat of such a stove to the heating of iron bars, or other similar purposes, the vertical partition is to be omitted, and instead of the vertical flue, there is to be an opening on one side of the stove, at a small distance above the grate, from which a flue ascends, forming an inclined plane, at the upper end of which there may be a vertical flue, or pipe. Bars of iron, &c. are to be passed in, through suitable valves, so as to occupy a part of the space of the inclined flue, where they are to be heated by the flame and heated air passing through it.

The claim is to "the above provision for heating anthracite coal, and for replenishing the fire with the same when heated; and also in combination therewith, the further provision for heating air as aforesaid; and both, whether the outlet for flame connects with the vertical interior flue, employed where rooms are to be warmed, or the inclined exterior one, employed where interior bodies are to be heated; together with the uses of said improvements as already applied, or to be hereafter applied, in the evolution and management of heat."

We have had an opportunity of seeing these stoves in actual use, but a casual observation in such a case will not justify the expression of a confident judgment respecting their utility; much depends in all such apparatus upon proper management; from all we have seen, however, we think favourably of them, and if their utility is commensurate with the beauty of the pattern, and casting, and the neatness with which they are put together, they will leave little to desire; we were, when lately in Philadelphia, informed by several persons who had used them "for heating rooms," that they were perfectly satisfied with them.

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10. For an improvement in the *Construction of, and Weighing by, the Steelyard Balance;* Erastus and Thaddeus Fairbanks, St. Johnsbury, Caledonia county, Vermont, September 22.

(The specification will appear hereafter.)

Specifications of American Patents.

Specification of a patent for an improvement in the mode of constructing Switches, or Turn-outs, for rail-ways. Granted to William Howard, *U. S. Civil Engineer, Baltimore, August* 2, 1832.

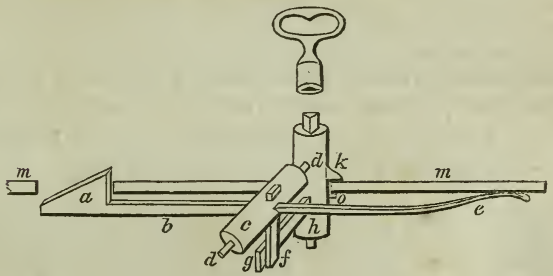
To all to whom these presents shall come, be it known, that I, William Howard, of the city of Baltimore, in the state of Maryland,

have invented a new and useful improvement in the mode of constructing switches, or turn-outs, for rail-ways, whereby the rail-way car, or wagon, is made to pass from the track of the rail-way as occasion requires, which I have called, "Howard's improved switch for rail-ways;" and that the following is a full and exact description of the construction and operation of the said improvement.

The switch now in ordinary use, may be moved from side to side by the hand, as occasion requires, and by any one who may choose to do so. The improvement which I have made consists in a contrivance by which the switch, constructed in the usual manner, is constantly retained in the general direction of the track on which it is fixed, (except when it is desired by the driver or conductor of a car, or train, to make use of it,) so that it shall not be exposed to be opened when not required, by accident, or malicious design, to the peril of lives and property transported upon the rail-way.

Upon the inside of the switch, and about half way between its extremity and the pivot on which it moves, is a hole in the cast iron plate, on which the switch traverses, of a fitting size: through this hole a catch projects from beneath the plate, over which the switch moves, as does the latch of a door; except that the switch does not rise and fall as it passes, but the catch does, retaining the switch in the general direction of the track, unless when it is desired to open it.

Howard's Switches for Rail-ways.



a. The catch, or latch.
b. Lever extending from it.
c. The axle, working on.
d d. Pivots.
e. Spring of the lever.
f. Projecting arm, moved by
g. An arm projecting from
h. The vertical axle.
k. Shoulder, and
o. Pin on do.
m m. The cast iron plate on which the switch moves.

The catch *a*, (see the drawing, a part of this specification,) is at

the end of a lever, *b*, which passes under the plate aforesaid, and through the axle *c*, working on pivots, *d d*, in boxes attached to the plate,—a spring, *e*, retains the catch against the switch, when the latter is in the general direction of the track, by pressing the catch up. An arm, *f*, projects from the axle *c*, at right angles to the plate, and is moved by a similar arm, *g*, projecting against it from the axle *h*, passing perpendicularly through the plate on the outside of the rail, and kept in its place by proper shoulders, *k*, and pins, *o*. The upper end of the axle *h*, is fitted to receive a key that is kept by the driver of the car, or train.

When it is desired to open the switch, the driver applies the key to the head of the axle *h*, and turning it, the arm *g* presses upon the arm *f*, moves the axle *c*, and causes the catch *a* to fall below the upper surface of the plate, when the switch may be opened. When the car, or train, has passed, the switch is shut by hand, and the catch resumes its place. A guard is attached to the switch which covers the catch, and prevents it from being pressed down, and the switch opened unnecessarily.

What I claim as new, and as my own invention, is the fastening of the switch in the general direction of the track to which it is attached; and I also claim as my own invention, the manner by which this is effected; so as to put the switches on the road under the control of the drivers, or conductors, alone, or persons properly using them.

Wm. Howard.

Descriptive account of, and remarks upon, a patent for an improvement in the art of raising water from the interior of the earth.—Granted to Lewis Disbrow, *Mechanician, and* John L. Sullivan, *Civil Engineer, city of New York, August* 28, 1832.

Mr. Disbrow has been extensively engaged in boring the earth, to obtain a spontaneous flow of water, from what, in Europe, have been called artesian wells. In the present specification two patents obtained by him are referred to; the first, for improvements in the tools and methods employed, bearing date the 24th of March, 1825; the second, for other improvements in the said art, and in the manner of introducing pipes into the perforation. The patentees state that the earth may be bored, or the pipes be introduced according to these plans, or to other known methods; the invention now claimed not depending upon either of these particulars, its essential object being to obtain water in large quantities in those cases where the water will not overflow; or where the quantity afforded is but small.

It was formerly the opinion of Mr. Disbrow, we believe, that overflowing wells might be every where obtained, all that was required being to bore to a *sufficient* depth; in many cases, however, this *sufficient depth* was not reached after the labour of many weeks, when the works were suspended, and have not been resumed. In many

instances, the water would rise to within a few feet of the surface of the ground, but could not be made to overflow; this, we are told, is the case in the city of New York, and its immediate vicinity. According to the principles set forth in the present specification, the idea of water being forced up from the bowels of the earth by some inscrutable *vis a tergo*, appears to be abandoned, as it is distinctly announced that the height to which the water will rise in the pipes, will depend upon that of the source whence it is originally derived; we are glad of this for two reasons, first, because we believe it to be correct, and we love the truth; and secondly, because it will prevent the undertaking of rash projects, in which it will be found much more easy to sink money than to raise water.

The plan for which the present patent is obtained, is the employment of a pump to aid in the raising of water from the bored orifices. It is proposed to fix a valve in the lower tube, with a chamber above it, and a piston with its valve, to work in the chamber; and the patentees are of opinion, that by this means the supply of water will be much increased, as the pressure of the column above the piston will be taken off, and the water supplied by the spring, or vein, in the earth, be left free to supply the place of what is raised, unobstructed by any superincumbent pressure. They say that "the principle of their joint improvement consists in the combination of a piston so constructed, and so placed in, and combined with, the said lowest pipe or joint of the tube set in or projected down the perforation, that the movement or action of the piston may be near the lower extremity of the whole tube in said perforation, and so connected and combined with some mechanical force sufficient to lift with ease the column of water which may be above the piston, as that the piston may be moved with a velocity proportioned, as near as may be, to the rapidity and force of the supply of water at the said lower extremity of the perforation."

We have thus given a full view of the principles upon which the patentees intend to proceed; principles which, in the abstract, we admit to be correct, but yet we are of opinion that the practical results will be very far from justifying their anticipations. Admitting, for the sake of argument, that a large quantity of water might be raised from a pump of this description, there is a high degree of probability that in a very great number of instances the vein would not supply the demand; a fact which cannot be ascertained without actual trial in each individual case, which must necessarily be attended with much labour and expense.

Another point well worthy of consideration, is the inquiry into the facility with which the water can be raised, admitting the supply to be abundant. In this investigation we must take into account the height of the column above the piston, the diameter of the piston, and the length and velocity of its stroke.

The patentees contemplate the raising of the water from the lower section of the tube, and their initial principle requires that this should be done, as the pressure of a high column is to be removed. The loss of power is very great in pumps of great length, from the

necessity of setting a great weight of water into motion at every stroke of the piston, its inertia having to be perpetually overcome, as in the return stroke it is brought to a state of rest.

As regards the diameter of the piston, this has, manifestly, to be circumscribed by the diameter of the tube, which can be sunk in the orifice made by boring; this, we apprehend, can rarely exceed four inches, when the depth is great, but even admitting that six inches might be obtained, we think that even this would not afford a supply adequate to the power which must be expended in obtaining it.

Can this want of sufficient diameter be compensated by the length and velocity of the stroke of the piston? We think not, for the velocity of the stroke cannot, with any advantage, be carried beyond a certain point; it is circumscribed by the very nature of the machinery, and we soon arrive at a maximum in this point. The longer the stroke can be made, the better, because there is less lost by the perpetual opening and closing of the valves, and the frequent coming to rest of the water. But this is the full amount of what can be gained in this way, as the lineal rapidity of the piston cannot be greater in a long than in a short stroke.

These are the principal considerations which induce us to believe that this plan cannot be available for affording a large supply of water through tubes sunk in bored openings in the ground. In the sketch of their plan, which the patentees have deposited in the patent office, a steam engine is supposed to be employed for the raising of the water; and certainly this, or other powerful means, will be necessary, and it will be equally so that the supply should be commensurate.

Towards the end of their specification, the patentees state that a series of valves may be placed at different heights, each to sustain its respective portion of the weight of the column of water. This, it is true, is only incidentally mentioned, and we are convinced that they have never tried such a project, or undertaken the investigation of it, as it will not "hold water." How are such valves to be fixed? not at all, without causing the piston rod to work through a stuffing box in each of them; and suppose them to be fixed, how is each to support its own column? are they not all open in the upward stroke, and for a sensible time afterwards? They would in fact have no tendency to close but by their own weight, as the weight of a continuous column would press upon the bottom only.

Specification of a patent for an improvement in the method of sizing paper by machinery. Granted to JOHN AMES, *Springfield, Massachusetts, Septemper* 1, 1832.

To all persons to whom these presents shall come, John Ames, of Springfield, in the county of Hampden and commonwealth of Massachusetts, gentleman, sends greeting:

Be it known that I, the said John Ames, have invented, made, and applied to use, a new and useful invention and improvement in the method and process of sizing paper by machinery, as is herein set forth and specified, viz. Upon a frame of proper strength and materials, I place, near and parallel to each other, three cylinders of wood, or metal, of about fifteen or twenty inches in diameter, and in length conforming to the width of the paper to be sized, to revolve in a horizontal position upon their respective axes. The boxes, or bearings, upon which the axis of one of said cylinders rests, are fixed; those of the other two are moveable, and governed by screws, so as to regulate the distances of the cylinders from each other. Above the line between the middle cylinder and one of the outer ones, and parallel to them, I suspend a pipe, or trough, pierced with small holes, in such a position that the sizing matter, with which said trough, or pipe, is to be filled, may drop between said two cylinders. Below said cylinders, three parallel rollers, corresponding in length with said cylinders, are arranged so that the middle roller shall be elevated a little above the line of the other two. Above the middle roller, I suspend another pipe, or trough, as above described, to be also filled with sizing matter. An endless web of felt is made to pass over one of the outer cylinders, and between it and the middle one, thence down under the middle roller; thence up between the middle cylinder and the other outer one; thence over the latter, and down under the two lowest rollers; and thence up to the place of beginning. The cylinders are to be brought in close contact by means of the screws applied to the said moveable boxes, or bearings. The paper to be sized is brought over the outer cylinder, and introduced between it and the middle one, immediately under the sizing trough, or pipe, from which the sizing matter drops, and sufficiently wets one side; it then passes under the middle cylinder to which it adheres: the felt passes down under the middle roller, and is wetted by the sizing matter oozing from the lower sizing trough, or pipe; and again ascending, it passes between the other outer cylinder and the middle one, pressing the paper against the latter, and thus sufficiently sizing the other side of the paper. The sized paper is to be then disengaged from the middle cylinder, (to which it adheres as aforesaid,) and taken off by a cylindrical or other suitable reel.

The moving power is applied to the middle cylinder, which communicates motion, by friction, to the other parts of the machine connected by the endless felt. The same result may be produced by a different position and arrangement of parts. I do not claim the cylinders, endless felt web, or other parts of the machine, separately, as my invention; all that I claim specifically as mine, is the several parts of said machine in combination, with the use of the endless felt web, for the purpose of sizing paper.

JOHN AMES.

Specification of a patent for a pulp dresser, for dressing pulp in the manufacture of paper. Granted to John Ames, *Springfield, Massachusetts, September* 1, 1832.

Know all men by these presents, that I, John Ames, have made a new and useful improvement in the method of dressing pulp for the manufacture of paper by machinery, set forth and specified in the words following, viz:—

I construct a vat of convenient size, and insert therein a wire-wound, hollow cylinder, constructed as follows; the skeleton, or frame work of the cylinder, is formed like the common wire cloth cylinder, with no more arms or interior work than are necessary to give strength and form to the cylinder. Instead of the wire cloth, a covering is formed by winding wire of a suitable size over the frame work, with interstices between the wires, of sufficient width for retaining knots, and allowing the dressed pulp to pass through. The cylinder is closed at one end and open at the other, with the open end closely adjusted to the side of the vat for conducting off the pulp, as is described in my patent method of "washing rags." I communicate to the cylinder a rotary motion. The pulp is admitted to the vat, and is dressed, or strained, by the wire covering. The knots, knobs, and other crude matter being retained, and the dressed pulp passing off through the open end of the cylinder to the vats, ready for use.

In some cases it may be convenient to reverse the process by passing the undressed pulp *into* the cylinder, straining it so that the dressed pulp shall pass from the exterior of the cylinder, leaving the knots within.

It may also be more convenient to conduct off the dressed pulp in the first described process, or to introduce the undressed pulp in the last, by means of a hollow arbor, with both ends of the cylinder closed, than by adjusting it as above described.

An agitator of any sort may be inserted in the vat, for stirring up the pulp, (in the first described process,) if the action of the cylinder be not sufficient for that purpose.

The improvement or invention that I claim specifically as mine, is the process or method of dressing pulp for the manufacture of paper, by using the wire-wound, hollow cylinder, or any hollow body, of any other figure, covered, or wound with wire, as above described, for that purpose.

John Ames.

Specification of a patent for an improvement in the mode of setting Glazier's Diamonds, of all kinds. Granted to John Dickenson, *city of Philadelphia, November* 30*th*, 1832.

I take the piece of metal in which the diamond is to be set, and drill a hole into it adapted to receive the handle, or shank, by which

it is to be held; not, however, drilling it entirely through, but nearly so; I then take a smaller drill with which I perforate it completely. This leaves a shoulder upon which the diamond, or spark, as it is sometimes called, rests, when dropped into the larger hole, whilst its cutting point passes through, the hole being so adjusted as to allow it so to do. The diamond may be readily adjusted so as to present its cutting point in the best possible position, and it is to be secured there, without soldering, which may be effected in various ways; as, for example, by strong cement, which may be pressed upon it by means of the end of the shank, or handle, which I then pass into the hole prepared for it. The mode, however, which I usually adopt, is the following. I tap the hole which is to receive the shank, so as to form within it a female screw, the shank forming a male screw working freely in it; after dropping the diamond into its place, and adjusting it there, I take a small piece of some malleable metal, and drop upon it, when, by screwing the shank into its place, it is made to press upon the malleable metal, and the diamond will be fixed in a manner which is perfectly secure, whilst it is susceptible of alteration, or adjustment, at any time, with the most perfect facility.

To the ferrule, or handle, I sometimes affix a piece of steel, or other metal, for the purpose of clipping corners, or strips, and removing narrow strips, which is commonly effected by a key, or a pair of pliers. This piece of steel, or other metal, has several notches made in it, of various widths, to adapt it to glass of various thicknesses.

What I claim as new, and as my invention, is the setting of glazier's diamonds, without solder, in the manner, and upon the principle above set forth; I also claim the attaching a piece of steel, or other metal, to the instrument, formed in the manner, and used for the purpose herein described and made known.

JOHN DICKENSON.

Specification of a patent for a mode of affixing sheet tin, and other metallic plates on to the roofs of houses. Granted to ANDREW GANDOIS *and* JOHN SWALES, *Petersburgh, Dinwiddie county, Virginia, January* 5, 1833.

As the mode of procedure is the same, whether sheet tin, or other metallic rolled plates are used, we shall, in our description, speak, generally, of the former article, in order to avoid repetition.

In our method of preparing the sheets, each side of the metallic plate is grooved, or turned over, thus attaching every plate to its contiguous plate, by each of its edges. There are no separate pieces employed to form clamps, straps, or ears for nailing through, this being provided for by the mode of preparing the plate itself. Before the upper edge of the plate is turned over, it is cut in to the distance of three-fourths of an inch, more or less, two cuts being made at the distance of an inch, or any other suitable distance from each other,

and when the edge of the plate is turned over, this is left, and forms a strap by which the tin may be nailed to the roof. This strap we sometimes leave close to one corner of the plate, so that when the side of the plate is turned over, the strap is in two thicknesses; in this case it is cut of greater width than is requisite when the strap is left at some distance from the groove, or turning over.

When larger sheets of metal are used, such as those of copper and iron, two, three, or more straps, may be provided on the upper edge of the plate, the spaces between them being turned over, so as to pass into the groove, or turn over, on the lower edge of the plate, or plates, next above.

What we claim as our invention, and for which we ask a patent, is the connecting the ends of the sheets by turning over, or grooving, at the same time leaving a strap, or straps, upon the sheet to nail them to the roof in the manner herein set forth, and represented in the drawing deposited in the patent office.

ANDREW GANDOIS,
JOHN SWALES.

Abstract of a patent for manufacturing the prussiates of potash and of soda, with other substances; and of fixing the elements of the prussiate of iron, as a substitute for indigo. Granted to FELIX FOSSARD, *of Philadelphia, (who has made a declaration of his intention to become a citizen of the United States,) December* 14, 1832.

The title of this patent, as given by the patentee, is, "An improved method, or methods, of manufacturing the prussiates of potash, and of soda; and a new and improved method, or methods, of applying the said prussiates, or other prussiates of potash and of soda, (with other substances or things which will be described,) and composing and fixing the elements of the prussiate of iron, as a substitute for indigo in dyeing wool in the flock, fleece, skeins, piece, or otherwise; also in dyeing silks, cotton, linen, and other textile or organic substances fit for the purpose of receiving colour, of a blue, blue-black, black, bronze, marron, and any other colours for which indigo has hitherto been employed as a groundwork, principal, or auxiliary."

Several processes have been devised, and patents obtained, for using the prussiate of iron, [Prussian blue,] as a substitute for indigo in the process of dyeing; from these the processes described in the specification of this patent, differ in many essential particulars, which are fully detailed in it, in a manner which manifests a very intimate acquaintance with the principles of chemical science, and with the practical manipulations of the dye-house. The specification extends over twenty-two closely written pages, without containing any thing which is extraneous, but merely those practical directions

and exemplifications which leave nothing to be desired by the scientific dyer. The specification gives the following as the "principal articles on which the claims are founded."

"1st. On methods and processes for manufacturing the prussiates of potash and of soda.

2nd. On the method of passing wool into an acid bath, before fixing the oxide of iron.

3d. On obtaining or fixing the oxide of iron on all textile substances, by means of the decomposition of the protosalt of iron, either by caustic alkalies, carbonates, or earthy alkaline caustics.

4th. On fixing the deutoxide of iron on all textile substances, by immersing them in a bath formed of the protosalt of iron, for example, in the neutral state.

5th. On the means of producing upon textile substances, a uniform oxigenation of the protoxide of iron, or an oxide more oxigenated, by means of a current of heated air blown upon them.

6th. On the use of an alkaline and saponaceous bath after the dyeing operation, before uniting the oxide of iron with the prussic acid of an alkaline prussiate.

7th. On the passing of the textile substances, (more or less dyed by the prussiate of iron,) into a bath of a soluble prussiate, after dyeing them.

8th. On the passing of the textile substances, more or less dyed by the prussiate of iron, either in a bath of protosalt of iron, or a persalt of iron, either the one or the other, or at once into a compound of these salts.

9th. On the means of giving to textile substances dyed with the prussiate of iron, a reddish blue colour peculiar to this salt, when combined with a substance affording a red dye.

10th. On the means of fixing the prussiate of iron, or copper, upon the textile substances, by way of double decomposition, by means of a bath composed of a soluble prussiate, and another composed of a protosalt of iron, or a salt of copper.

11th. On the means of producing green dyes on textile substances by the prussiate of iron, and a vegetable or mineral substance giving a yellow dye.

12th. On the use of boracic acid in the bath, which gives a peculiar red to the blue, and to those which afford a yellow dye, and more particularly to the vegetable colouring materials, in order to obtain green or black dyes by the prussiate of iron, or of copper.

13th. On the means of producing blacks, &c. on textile substances, and on fixing on them the oxides of iron, and of copper, before passing them into vegetable, the colouring, or other baths, and without putting metallic salts into these baths.

14th. On the employment of baths for increasing or diminishing the intensity of colour.

15th. On the means of preventing the change of colour on the dyed fabrics, when exposed to the action of steam or air.

16th. On the general employment of the constituents forming the prussiate of iron, instead of the solid compound so termed, as I do

not actually employ the prussiate of iron known in commerce, but manufacture its principal constituent parts, and bring them into union upon the surface of the cloth, or other textile substance intended to be dyed.

17th. On the principles, the characters, the effects, and consequent results, of the preceding articles, applied to the works of a dye-house."

"Many of the things described in the various processes, are not, strictly speaking, my invention; but I claim the practical and special application to which I adapt them, in the processes of manufacturing the prussiates of potash and of soda, and of dyeing by these and other substances, by the methods indicated."

It is the design of the patentee, we believe, to obtain another patent for apparatus invented by him for the purpose of facilitating some of the operations in his processes; when this is done, we may find it necessary to present those processes, with drawings of the machinery adapted to them. To give them now would, in the opinion of most of our readers, render the present notice unacceptably long.

In order to exhibit the experience of the patentee as regards the utility of his modes of procedure, we give the following extract of a letter from him, which must appear of the greater value, as it was written merely for the satisfaction of the editor, and without any view to publication.

"The advantages offered by my processes over those now in use, are as follows. In the manufacture of the prussiates, there is an easier and much more profitable result in the labour, as for example: by the methods now in use, only about eighty pounds can be produced daily; whereas, by my method, six or seven hundred pounds can be prepared in the same time; by my method, too, all the materials are converted into prussiates, whilst by those now in use, the residuums of the calcinations are generally thrown away, by which a great quantity of potash is lost.

"The difference existing in price between the two principal materials used in dyeing wool, prussiates of potash and indigo, is immense; and must always exist in favour of the prussiate, as indigo cannot be produced to compete with it, without ruin to the planter; the prussiates, on the contrary, will, if a more general and certain means for their employment is created, descend to a very low price, the articles used in their production being extremely cheap; these materials are potash,and those kinds of refuse animal matter which, when not so employed, are actually thrown away. In dyeing by my process, the prussiate is substituted for indigo, nearly pound for pound. The method of dyeing by indigo does not admit of operating upon more than about sixty pounds of wool at one time, whilst by my process I can dye ten times that quantity, with the utmost facility.

"The cloths dyed by indigo, when cut, always appear of a light tint in the middle of the thread; whilst those dyed with the prussiates, by my process, are as dark within as on the surface.

"The fastness of the colour produced by the prussiate of iron, is manifest upon an examination of the two samples herewith sent; the largest is as it came from the fulling mill; the smallest is part of the elbow of an old coat."

The sample last mentioned was worn completely threadbare, but the intensity and uniformity of the colour did not appear to be in the slightest degree impaired, exhibiting none of that mixture of blue and white seen on the seams, and worn parts of indigo dyed cloths.

Mr. Fossard, we learn, has assigned his patent to Capt. Charles Dixey, of Philadelphia.

ENGLISH PATENTS.

Patent granted to Geo. Goodlet, *Proprietor of the London, Leith, and Edinburgh steam mills, for a new method of preparing rough meal from ground wheat, or other grain, previous to its being dressed for flour; also rough meal from ground barley, malt, or other grain, previous to its being put into the mash-tub for brewing or distilling. Dated May* 3, 1832.

This invention is merely the spreading out over a large surface, and to the depth of six inches, more or less according to circumstances, the rough meal of wheat for flour, or of barley for malt, or of oats for oatmeal. Malt is kilned, and oats are kilned commonly, and the process is well understood. Mr. Goodlet's plan is to dry up and improve other grain in the same manner. The floor of this drying room should be over a steam engine, or heated by flues from one, according to the purpose for which it is intended. This is the whole of the invention.

Its fruits are, that the meal or flour is finer, and will produce more abundantly than if ground without this precaution; but its most essential advantage is, that flour rather unsound may be made wholesome and nutricious by this process. The husk, or bran, is also finer and better adapted to its different purposes; new wheat can be ground immediately without any mixture of the old; and, above all, the bread produced from flour thus prepared is better than that of the common process.

"One hundred and twenty-two *loaves* have been produced from a bag of this flour," says Mr. Goodlet; and the same number may be produced from a peck of common flour, say we, for, what *is* a loaf? The specification tells us that the patentee holds certificatess from several most respectable bakers, declaring the superiority of the bread they bake from his flour—a very ingenious mode of mutual puffing! However, we have no doubt that the application of regulated heat to the rough farina might be the means of removing evil qualities from unsound grain, and this is enough to recommend the plan. At present

there is an abundant harvest—the stores of mercy are open, but in a time of scarcity or dearth the recollection of this plan of making that wholesome which is otherwise noxious, must be held in memory.

[*Rep. Pat. Inv.*

Patent granted to RICHARD BURGESS, *doctor of medicine, for his having invented a drink for the cure, prevention, or relief of gout, gravel, and other diseases, which may be applied to other purposes. Sealed February*, 21, 1831.

It has always been our opinion, that patents for medicine in this country, where the specification is exposed to public examination, never can be productive of remuneration to the inventor—for, if the recipe set forth is really efficacious when administered to the disease for which it is prescribed, every physician would avail himself of the knowledge thus afforded, and secretly administer the same medicine with impunity. It is this circumstance which has induced the French government to seal up all specifications for chemical preparations, until the patent has expired, and then to publish them for the benefit of the world at large.

If our opinion be correct in its general application, with what truth it applies to the subject now before us, our readers will immediately see, when we state that the patentee's discovery does not consist in any particular combination of drugs or chemicals, nor in any precise discipline or regimen, but simply in the fact, that water, pure water, taken into the stomach, will cure those complaints which have baffled the art of medicine for numberless ages.

The patentee says that his invention consists in using distilled water as a drink for the prevention and cure of gout and gravel; and he argues that as the water by distillation will be freed from any earthy or mineral matters which it might before have held in solution, and also that the animalculi which it contained will be destroyed, the water will not only be prevented from depositing any injurious substances on the coats of the stomach, but also that it will, by its purity, be induced to take up those which may be formed there.

Temperance is certainly the best preventive against disease, and water in its purest state the most wholesome beverage, but is it not rather hypothetical reasoning to assume that the impurities of the liquids which we swallow are the sources of those diseases which we suffer? Is it not more probable that the solids which we take, by chemical changes in that wonderful laboratory, the stomach, are made to generate, and to deposit those matters which frequently form the embryo or nucleus of future disorders in the system?

[*Lond. Jour.*

Patent granted to F. C. Jacquemart, *Esq. in consequence of a communication made to him by a foreigner, residing abroad, for an invention of improvements in tanning certain descriptions of skins. Sealed October* 20, 1832.

The patentee states that the skins of hares, rabbits, and sea rats, after having the down removed from them, (which is used in making the inferior quality of hats,) has hitherto been considered too thin to be converted into leather, and consequently has been rejected as useless, except for making glue. It is therefore proposed by a new mode of treatment, both in preparing and tanning, to render these several kinds of skins available to the purposes of making boots, shoes, gloves, and other articles, and it is for this particular method of treating those skins that the present patent is taken.

The description given of the improved process is exceedingly confused, but which, as far as we can make it out, is as follows. After pulling out the long hairs, the skins are to be rubbed with *mercurial aquafortis*, and dried in a temperature of from forty-five to fifty degrees Reaumur's thermometer, then steeped in salt and water, and afterwards in water and blood, in order to give them substance, and to kill the salt, and then in water saturated with *dead lime.* Having been thus prepared, the fleshy parts are to be removed, the hairs taken off, and the skins placed in tan pits, with a solution of sulphuric acid, and treated much as leather is usually treated in tanning, and then prepared by currying, and so forth, according to the kind of leather intended to be produced.

When the skins are to be preserved with the fur upon them, they are first steeped in a solution of alum, and then of lime water, and afterwards dressed as usual, which preparation, it is stated, will prevent the future destruction of the skins by moths.

[*Ibid.*

Patent granted to Samuel Clerk, *for his having invented certain improvements in making or preparing saddle linings, saddle cloths, and girths, for keeping saddles in their place on horses and other animals of burthen. Sealed October* 20, 1832.

In order to prevent a saddle from slipping when attached to the back of a horse, it is proposed by the patentee to line the under part of the saddle with a peculiar kind of cloth or webbing, to be made with ribs or cords standing out, which shall, when pressed upon the back of the horse, embed themselves in the hairy coat of the animal, and thereby hold the saddle firmly.

This cloth, or webbing, is to be woven in an ordinary loom, and in place of some of the warp threads, a series of hard twisted cords about

the size of goose quills, are to be introduced, at about half an inch apart, (spaces in the reed being broken away to receive them,) and when connected to the healds of the loom, as the other parts of the warp, they are to be woven together with the weft in the usual way, and so form a cloth or web, with ribs, cords, or ridges, standing out.

This ribbed cloth, or web, is to be attached to the under part of the saddle, by the ordinary means of stitching linings; and it may also be employed for saddle cloths and girths. [*Ibid.*

Patent granted to P. YOUNG, *for a new mode of manufacturing mangle-wurzle, for the purpose of producing certain known articles of commerce. Dated March* 22, 1832.

The articles of commerce proposed to be produced from mangle-wurzle are, first, liquor fit for the use of the distiller and spirit dealer; secondly, liquor fit for the use of the vinegar manufacturer; and, thirdly, a pulp fit for the use of the paper manufacturer.

The mangle-wurzle is first to be cleansed by washing, brushing, scraping, and rashing. It is then to be enclosed in woollen or hair cloths, and the juice forced from it by the application of a hydraulic or other powerful press. The juice is then to be collected and placed in a copper, or boiler, and heated to nearly one hundred and ten degrees of Fah. Diluted sulphuric acid in the proportion of about ten ounces to a hundred weight is then to be added by degrees, and the mixture gradually cooled down to sixty or seventy degrees Fah. Yeast is then to be added in the proportion of one per cent. The liquor is now to be fermented and attenuated by the addition of the least possible quantity, which will answer the purpose of malt and common wash: the acid to be employed is to be diluted in the proportion of one part of acid to five parts of water, and ten ounces of the mixture applied to 100 gallons of liquor.

The residue of the mangle-wurzle left in the press after the juice has been expressed is to be employed in the manufacture of vinegar by adding to one ton of it a hundred gallons of cold water, and applied with saccharine matter to the production of vinegar, according to the process usually adopted in the manufacture of that article.

The fibrous refuse of this manufacture is now to be prepared for the paper maker by the application of a bath, consisting of water and acid in the proportion of a hundred gallons of water to two pounds of acid. It is then to be bleached by the application of sulphuric acid gas, or chlorine in the usual manner; and the pulp thus obtained is to be mixed with that of rags, or hempen materials, in the proportion of ten to fifty per cent., according to the quality of paper required.

[*Reg. of Arts.*

List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the third quarter of the year 1831.*

[translated for this journal.†]

Ardaillon, Bessy & Co., Saint Charnond, (Department of the Loire,) September 20th, (10 years.) A process for manufacturing gun barrels under the roller. (P. Invent.)

Ph. Aubin, statuary, Paris, August 16th, (5 years.) Method of paving in mosaic. (P. Invent.)

St. Benard, Paris, September 10th, (5 years.) A portable and economical furnace, and steam stove. (P. Invent. Improv.)

Berard and Wilkinson, represented at Paris by M. M. J. Luce, August 16th, (15 years.) A bobbin and its wain, adapted to the spinning, stretching and twisting of silk, flax, hemp, wool, and cotton thread, and of every other filamentous substance. (P. Import. and Improv.)

J. Boivin, jr, mechanician at Saint Etienne, (Department of the Loire,) August 6th, (5 years.) A process for manufacturing gun barrels under the roller. (P. Invent.)

John Boivin, jr., mechanician at Saint Etienne, (Department of the Loire,) September 10th, (5 years.) A process for manufacturing gun barrels under the roller. (P. Improv.)

F. Bollen, starch maker, at Maison-sur-Seine, represented at Paris by M. Armonville, August 1st, (5 years.) A fixed sieve, with an iron stirring apparatus, moved by wheels, calculated to extract the fecula of potatoes, and to sift the starch. (P. Invent. Improv.)

L. H. Boquet, bronze colourer, at the Sevres manufactory, August 1st, (10 years.) A mechanical inkstand, calculated to keep the ink fluid, and which can be filled and emptied at pleasure. (P. Invent. Improv.)

Lewis Brunier, architect, Paris, August 6th, (15 years.) A hydraulic apparatus which he calls Continuous Hydromoter. (P. Invent.)

Peter, Anthony, and Lewis Burat, brothers, truss makers, Paris, September 10th, (10 years.) New trusses with fixed cushions, and with moveable and folding springs. (P. Invent. Improv.)

Francois Ar Caron, lamp maker, Paris, September 10th, (5 years.) Improvements made in the hydrostatic lamp of the brothers Girard. (P. Invent. Improv.)

J. C. Chabert and L. Legris, Paris, August 1st, (10 years.) A portable wind mill. (P. Invent.)

* P. Invent. denotes patents for inventions. P. Invent. and Improv. patents for invention and improvement. P. Improv. Patents for improvement. P. Import. Patents for importation, or the introduction of foreign inventions and improvements.

† By request of the Committee on Publications.

George Choisy, Paris, August 16th, (5 years.) A reckoning foot board, applicable to carriages. (P. Invent.)

George Choisy, Paris, September 10th, (5 years.) A reckoning foot board applicable to carriages. (P. Improv.)

Nicholas Clement Desormes, engineer, Paris, August 29th, (15 years.) Substitution of wood instead of charcoal, in certain furnaces. (P. Invent. Improv.)

Nicholas Clement Desormes, engineer, Paris, September 12th, (15 years.) Substitution of wood in lieu of charcoal, in certain furnaces. (P. Improv.)

Lord Cochrane, of London, represented at Arras by Martin, attorney, and at Paris by Columbus Gengembre, architect, August 6th, (15 years.) An improved rotary engine to be worked by steam, &c. or employed for other purposes. (P. Import.)

A. Courtet, mechanician, Lyons, August 6th, (10 years.) A machine for glossing milled stuffs of silk, cotton, or wool. (P. Invent.)

J. Fr. Cornu, watch maker, at Havre, September 10th, (5 years.) A marine clock which can be used as a jack. (P. Invent.)

Hyp. E. Descamps, at Agen, September 10th, (5 years.) A stove for preserving plums. (P. Invent.)

C. A. Dronsard, at Neuilly, near Paris, August 1st, (5 years.) Method of manufacturing a stuff, which he calls Philippine, for making hats, wall hangings, &c. (P. Improv.)

C. A. Dronsard, at Thernes, near Paris, September 10th, (5 years.) Method of manufacturing a stuff, which he calls Philippine, for making hats, wall hangings, &c. (P. Improv.)

Baz. Ducel, chemist and mechanician, Lyons, August 6th, (10 years.) Apparatus for drying dyed silks, and stuffs made of silk, wool, or cotton, and for desiccating gelatinous substances and strong glues. (P. Invent. Improv.)

Durand & Co., dyers, Department of the Loire, July 18th, (10 years.) Process for forming designs on all sorts of silk, wool, and cotton stuffs, by means of pressure. (P. Improv.)

John Everth, of London, represented at Paris by Truffaut, August 6th, (15 years.) Processes for separating the two constituent principles of palm oil, in order to use one as a lamp oil, and the other for the manufacture of candles. (P. Invent. Improv.)

E. Felissent, Lyons, July 18th, (15 years.) An apparatus for desiccating by air heated directly by fire. (P. Improv.)

Festugieres, brothers, iron masters, August 22nd, (10 years.) Rollers with a single cylinder and bed, for the manufacture of Biscaian guns, balls, and other articles of smith's work heretofore stamped. (P. Invent.)

J. Forgues, mechanical engineer, Bourdeaux, September 10th, (5 years.) An apparatus which he calls a physico-mechanical safety apparatus, for preserving houses and persons from destruction by fire. (P. Invent.)

Cl. M. A. Francois, jr. and Ed. Michel Benoist, represented at Paris by Mr. Armonville, secretary to the conservatory of arts and trades, September 30th, (5 years.) A globe of paper or satin, which be-

comes inflated when shaken, and can be folded up so as to be portable. (P. Import.)

J. D. C. Gavard, captain of staff, Paris, September 20th, (10 years.) An apparatus for drawing and engraving, by a continuous motion, and without any knowledge of the art of drawing. (P. Improv.)

Ant. Georges, mechanician, Lyons, September 20th, (10 years.) A machine for thrashing and winnowing corn, at the same time. (P. Improv.)

Jos. Gibson, lace maker, Lisle, August 29th, (10 years.) Method of manufacturing tulle, or silk lace. (P. Import.)

J. M. Giudicelli, professor of mathematics, Paris, and C. L. Harel, Merchant, Paris, September 10th, (5 years.) A mechanical appararatus, which they call a percussion vane. (P. Invent.)

P. L. Et. Guilliny, silk trader at Lyons, Department of Drome, August 29th, (10 years.) A process for giving a determinate length to the flocks of silk, which are wound upon reels, as fast as they are worked. (P. Improv.)

Thomas Hall, Havre, September 30th, (5 years.) A machine to make compressed tree-nails. (P. Import. Improv.)

Hyp. Houldworth, jr. of Manchester, represented at Paris by Mr. Perpigna, August 29th, (15 years.) An improvement in the manufacture of cotton, flax, silk, or any other filamentous substance, employed separately or mixed, so as to produce a fabric applicable to different purposes. (P. Import. Improv.)

Nicholas Houzeau-Muiron, of Reims, at Paris, September 10th, (5 years.) A process for making metallic tubes applicable to artillery, to fire arms, and to other purposes. (P Invent. Improv.)

Abraham Emanuel Jaccond, merchant at Vienna, represented at Lyons by Mr. Bert, merchant, August 16th, (10 years.) Processes to be applied to stocks, axle-trees, sockets, and pivots of every description of wheels, possessing the advantage of containing in each of these parts, and without any loss, the oil necessary for greasing it. (P. Improv.)

Hyp. Janford, mechanician, Paris, represented by Ashby, paper manufacturer, September 10, (5 years.) A machine which he calls a purifier, intended to separate from the pulp which forms paper, all particles which may soil it, or roughen the surface. (P. Import.)

A. Jeuffrain, at Tours, August 6th, (5 years.) A hydraulic press, for the compression of substances from which any liquid is to be extracted, and of those whose bulk is to be reduced, or to which any determinate form is to be given. (P. Invent.)

F. L. John, mechanician, Paris, September 10th, (5 years.) Mechanical legs of iron. (P. Invent. Improv.)

C. Juillet, jr., Lyons, July 13th, (15 years.) A machine for manu facturing all sorts of figured stuffs. (P. Improv.)

Fred. Kalkbrenner, Paris, August 1st, (5 years.) A hand guide, intended to facilitate the study of the piano forte. (P. Invent. Improv.)

Franc. Ant. Klenck, iron and brass founder, Paris, September 10th, (5 years.) A machine for manufacturing small nails or tacks, called *Pointes de Paris.* (P. Invent. Improv.)

J. B. M. J. Lancry and Nicholas Charoy, Paris, August 29th, (5 years.) A musket, or fowling piece, to fire two shots with a single barrel and lock. (P. Invent.)

L. Séb. Lenormand, professor of technology, Paris, August 22nd, (10 years.) A new system of lighting. (P. Invent.)

[TO BE CONTINUED.]

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

[Translated for this Journal.*]

New Process for Purifying Oils.

The practical and useful methods of discolouring and purifying vegetable oils, are all based on the same principle; namely, the use of oil of vitriol, (concentrated sulphuric acid.) Authors who have written on the subject, do not agree as to the proportion of acid to be used, but it is essential not to go beyond certain limits. Oils are not all capable of being clarified to the same extent, so that by proceeding exactly as is done at Lisle, in France, and using the same quantities of acid and of oil, a clear oil is by no means certain to result. The same anomaly will be observed if the expressed oils are used which have been made of seeds that have not been heated or preserved with equal care. The methods used by the manufacturers of Lisle are as follows:

First Process.

Pour gradually into eight hectolitres* (210 gallons,) of oil, which is stirred during the operation, twenty pounds of concentrated sulphuric acid. After the mixture has been agitated without intermission from three-quarters of an hour to an hour, with a large spatula, perforated at the end, add to it one hectolitre of pure spring water, and continue to stir rapidly for twenty minutes. Let the mixture rest fifteen days and then decant it very carefully, pouring on the strainers the oil which swims on the surface, after having first beaten it with a new quantity of water, (about one hectolitre:) this operation may be performed four days before the filtration. In order to separate the mucilaginous particles that might stop the strainer, pass the oil through a hurdle covered with a very thin woollen cloth.

Second Process.

The method of purifying oil, by decoction, used by the makers of

* By request of the Committee on Publications.

† The hectolitre is a French measure of capacity equal to about 105 English quarts, or 26¼ gallons.

varnish, has been applied by the Dutch manufacturers. The following is their manner of operating:

Pour into a boiler capable of containing from six to eight hectolitres ($157\frac{1}{2}$ to 210 gallons,) the three-fourths of its capacity of oil, and bring it quickly to ebullition; throw in, from time to time, a few litres* (quarts,) of cold oil, at the places where the ebullition is the strongest, and sprinkle now and then, with the ends of the fingers, a few drops of water, which being instantly vaporized, will not cause danger. At the end of fifteen or thirty minutes, the fire is allowed to subside, the oil becomes cool, and is carefully decanted. It is then clarified as in the first process, except that only half the quantity of sulphuric acid must be employed; and if the operation is not perfect, it must undergo a second treatment, by a small quantity of acid. This process is more tedious than the first, and consequently is less frequently used; there are, however, some oils which require this previous operation. Light coloured oils are the most easily purified by these two processes.† When the refiners are, at the same time, manufacturers, they should moisten the seed which is to supply the oil for clarification more than the rest, taking care not to mix with the oil those from a second boiling, and decanting before the addition of the acid; and on the day previous to the clarification, the oil should be stirred for twenty-six minutes with three or four per cent. of boiling water. The object of this addition is to moisten the mucilage, which is then more easily attacked by the acid. This water must be added and withdrawn previous to the operation of clarifying.

Filtration.

The process for purifying oils by filtration has not undergone any considerable change for some years. The use of sawdust instead of charcoal did not answer the expectation of the refiners. The renewal of this article as often as is required, is rather expensive, and there is always a quantity of oil absorbed, which cannot be entirely recovered by pressure. Whatever be the method employed, it is necessary to operate in a dry and warm place, at a temperature of fifty-nine to sixty-five degrees Fah., kept up during both day and night. In order to effect this some persons place the filters in cellars where there are fires, and sometimes they surround the filtering vessels by a second enclosure, into which steam is introduced. The filtering vessels generally used are upright casks, open at the top, and perforated at the bottom with a great number of holes: a layer of cotton is placed in each cask from two to four inches in thickness, and supported by canvass; the casks are then filled, and the tops covered with a piece of cloth to keep out dust.

* One litre is equal to one and one-twentieth of a quart.

† The methods in common use in many parts of France to extract oils are liable to objections: the oleaginous seeds are too much roasted, and not sufficiently moistened. The oils resulting from them are too deeply coloured, and are difficult to clarify.

Second process.—Into a cask open at the top, and perforated at the bottom, as in the process just described, put a layer, two inches in thickness, of charcoal, broken into pieces of the size of a hazle-nut, and washed.* Over this layer a second stratum is placed, four, six, or eight inches thick, and composed of charcoal broken into smaller pieces. Above both of these a layer of cotton is placed, supported by a piece of coarse canvass.

Third process.—Into a hamper, six feet in height, five feet in diameter at its mouth, and one at the bottom, placed in an inverted position, are fixed by means of canvass several layers of cotton; likewise on the perforated bottom of a cask a layer of two or three inches of cotton is placed, which must be covered by saw dust of white wood (not pine,) to the thickness of eighteen or twenty inches.

These different processes, simultaneously or separately employed, constitute the whole secret of filtration. It may be found adviseable to vary the thickness and number of layers; a point which the manufacturer must determine for himself.

[*Journal des Connais Usuelles.*

Manner of imparting a beautiful Watering (moiré) to Brass.

Having had occasion to boil in a solution of sulphate of copper, some pieces of brass, such as candlesticks and various articles of ornament, I observed the effects of a crystallization, analogous to watering, but more rich because it reflected more light. One point was particularly striking, namely, that spangles bearing an exact resemblance to opal, seem to be united with a deep coloured paste, formed of finer reddish crystals. Certain brasses assume the appearance of porphyry, others of granite, with various shades, according to the proportions of zinc and copper therein contained. In some instances an article will become of a deep red colour or dark violet, without any appearance of reflection produced by the solution; and, when carefully washed, a white dust will be formed on its surface; but a slight friction, with small quantity of varnish, will suffice to give the desired appearance. A few small iron nails left in the solution will quicken the operation. As to the strength of the solution it can only be determined by experiment, but it should be concentrated and boiling. One pound of sulphuric acid to two of water appeared to me quite sufficient. The pieces which are to undergo the operation may be suspended by a thread, so as to be conveniently dipped into a boiler of glass, or of glazed earthenware. [*Ibid.*

* The charcoal is to be washed while in lumps, and then carefully dried in a stove.

Simplified Application of Steam.

At a meeting of the Paris Academy of Arts and Sciences, held on 7th January, a memoir was read, in which M. Pelletan treated of the dynamic effects of a jet of steam, and the means of applying it, in a simple and cheap way, to the purposes of the useful arts. "A jet of steam," says the author, "when thrown into a cylindrical conduit, or into a pipe filled with air, imparts the active power with which it is endued to the column of air, without any other loss than that occasioned by the friction in the conduit or pipe."

His detail of the results, which have already ensued from his discovery, are deserving of attentive notice. A jet of steam issuing through an orifice of a milimetre, ($\frac{03937}{100000}$ of an inch,) under a pressure of five atmospheres, possesses a velocity of five hundred and fifty-nine metres, (1084$\frac{3}{8}$ feet,) per second; it consequently moves at the same rate of velocity as a bullet discharged from a gun.

But this enormous velocity is, in its simple form, of no practical benefit, inasmuch as it cannot be converted into a useful agent; when, however, the steam has been enabled to impart motion to a quantity of atmosphere, the velocity, it is true, is diminished, but the mass set in motion is increased; and, by this operation, the active power of the jet of steam is susceptible of general application.

The elastic force of steam has hitherto been employed under pressure, by the aid of machines, which are necessarily complicated, and involve a serious loss of power from their bulkiness and friction; but steam, acting immediately by its own power, can be made to effect its objects in machines of so simple a construction, that a steam engine of one man's power may henceforth be worked by a common fire.

M. Pelletan remarks, that the force of steam, so applied, may be brought directly in aid of the machine, and will enable him to double and treble his daily gains, instead of its powers being limited, as hitherto, to filling the coffers of great capitalists at a compound ratio.

The same jet of steam, when applied to the purpose of increasing the draft of furnaces, enables the proprietor to reduce their diameter to two inches, even where a large furnace is in question, to lead the smoke in any direction which may suit him best, and to make use of the whole heat produced. By means of this jet a vacuum may be effected at will, in any given space, however considerable it may be, and permanently maintained, not only at very small cost, but through the medium of an apparatus of the simplest construction. This process is of ready application wherever evaporation or desiccation are to be effected. Acting upon a column of air, the jet supplies the simplest and most efficacious mode which can be adopted for creating blasts in forges, furnaces, &c.

It appears that the inventor claims priority in this important discovery, inasmuch as he communicated the properties of the jet in a paper addressed to the Academy in 1829, and he is tenacious of the claim in consequence of the later application of the jet in impelling steam carriages in England. [*Athenæum.*

¶ *On the timber used for the Masts of Ships.*

Communicated to the Nautical Magazine by JOHN FINCHAM, Esq., Superintendent of the School of Naval Architecture in his Majesty's Dock Yard at Portsmouth.

[Continued from p. 137.]

The experienced mast maker forms his opinion of the quality of a stick, not only from the colour, smell, and appearance of the grain, but by its working; for as a stick is more or less tough or fragile, the greater or less difficulty he has in separating its parts, as he chops them off. If the timber be good, its parts, on being separated, appear stringy, and oppose a strong adhesion; and the shavings from the plane will bear to be twisted two or three times round the fingers: whereas, if the stick be of a bad quality, or in a state of decay, and has lost its resinous substances, the chips and shavings come off short and brittle, and with much greater ease.

Table I.

Experiments on pieces three inches square, and two feet long beyond the support, fixed at one end; weights acting at two feet.

Distinguishing No.	Species of Timber.	DEFLECTION. with five cwt.	with 10 cwt.	with 12½ cwt.	with 15 cwt.	Weight that the pieces broke with.			Specific gravity	Remarks.
		ins.	ins.	ins.	ins.	cwt	qrs	lbs.		
1	Riga Top	,52	1,02	2,07	3,1	16	2	0	605	All the speci-
2	— Butt	,4	,8	1,5	2,87	18	3	0	668	mens in these
3	— —	,37	1,0	1,37	1,62	16	1	0	821	expt's. were
4	Red Pine Top	,63	1,42	2,68		14	2	6	544	dry.
5	—— Butt	,6	1,07	1,95		16	3	1	634	
6	Am. Spruce Top	,56	1,32	2,13		13	2	6	504	
7	—— Butt	,5	,9	1,67		15	3	22	570	
8	Norway Top	,55	1,04			12	0	26	464	The butts
9	—— Butt	,62	1,35	1,97	3,0	16	2	12	506	of these spe-
10	Adriatic Top	,5	1,0	2,0		12	3	26	467	cimens were
11	—— Butt	,4	,7	1,4		15	1	8	493	tough.
12	Yellow 6 inch Top	,62	2,0			11	1	0	406	The heart of
13	—— Butt	,63	2,12			12	1	18	493	pune, in all
14	Scotch Spruce Top	,58				9	3	16	389	cases was con-
15	—— Butt	,54	2,0			10	3	26	440	siderably
16	Cowrie Top	,37	,75	1,12	1,62	17	2	0	626	weaker in pro-
17	— Butt	,5	,87	1,25	1,87	18	3	0	632	portion to the
18	Pune Top Outside	,46	,62	,9	1,4	18	2	14	654	outside than
19	— — Heart	,62				9	3	18	608	any of the
20	— Butt Outside	,37	,75	1,0	1,25	20	3	14	646	other experi-
21	— — Heart	,57	,8			10	3	24		ments.

Table II.

Experiments on pieces three inches square, supported on two props, four feet distance; weights acting at the middle.

Distinguishing number.	Species of timber.	Deflection with 15 cwt.	What it recovered by its resilience when the weight was removed.	Deflection with $22\frac{1}{2}$ cwt.	What it recovered by its resilience when the weight was removed.	Deflection after one hour's pressure with $32\frac{1}{2}$ cwt.	What it recovered by its resilience when the weight was removed.	Weight that the pieces broke with			Specific gravity.	Remarks.
		ins.	ins.	ins.	ins.	ins.	ins.	cwt	qrs	lbs.		
1	Riga top	,31	,29	,62	,59	,97	;91	32	2	14	664	Pieces in these expt's were green.
2	— butt	,25	,22	,53	,5	,85	,73	35	1	10	720	
3	Red pine top	,81	,68	1,37	1,13	1,4	1,1	23	1	6	627	Most of these broke off after the pressure had continued about five minutes.
4	—— butt	,63	,59	,95	,91	1,2	1,05	28	3	24	712	
5	Am. spruce top	,37	,36	,62	,6	1,87	,95	21	1	26	598	
6	——— butt	,31	,29	,63	,61	1,07	,95	23	2	14	643	
7	Norway top	,57	,50	,82	,8	1,37	,93	21	2	0	572	
8	—— butt	,58	,56	,84	,82	1,37	,95	23	1	14	595	
9	Adriatic top	,30	;29	,42	,4			21	1	6	532	
10	—— butt	,29	,27	,43	,41	,65	,45	23	0	16	582	
11	Yellow pine top	,89	,77	1,41	1,1			21	2	0	553	
12	——— butt	,73	,6	1,0	,9			23	3	26	661	
13	Scot. Spruce top	,84	,83					18	2	0	478	
14	——— butt	,72	,7					19	2	6	542	
15	Cowrie top	,31	,3	,43	,41	,62	,54	35	2	7	626	
16	—— butt	,31	,3	,43	,41	,62	,54	36	0	0	643	

Table III.

Experiments on pieces three inches square, supported on two props, four feet distance; weights acting at the middle.

Distinguishing number.	Species of Timber.	Deflection with 15 cwt.	What it recovered by its resilience when the weight was removed.	Deflection with $22\frac{1}{2}$ cwt.	What it recovered by its resilience when the weight was removed.	Deflection after one hour's pressure with $22\frac{1}{2}$ cwt.	What it recovered by its resilience when the weight was removed.	Weight that the pieces broke with			Specific gravity.	Remarks.
		ins.	ins.	ins.	ins.	ins.	ins.	cwt	qrs	lbs.		
1	Riga top	,5	,48	,93	,87	1,01	,97	32	1	4	516	Pieces in these exp'ts. were dry.
2	— butt	,31	,3	,62	,56	,97	,85	34	1	14	633	
3	Red Pine top	,56	,51	1,25	1,13	1,37	1,2	23	0	0	514	
4	—— butt	,42	,40	,62	,56	,69	,6	25	0	0	644	
5	Am. spruce top	,47	,38	,91	,87	1,08	,97	22	2	26	488	
6	——— butt	,47	,35	,82	,78	1,06	,94	22	3	1	546	
7	Norway top	,51	,49	,83	,81			21	0	14	464	Very good specimens.
8	—— butt	,57	,56	,84	,8	1,0	,81	23	0	14	506	
9	Adriatic top	,27	,25					21	0	26	443	
10	—— butt	,25	,23					22	1	23	462	
11	Yellow Pine top	,6	,48					21	1	0	395	
12	——— butt	,66	,5	,99	,67	1,6	1,21	23	2	0	442	
13	Scot. Spruce top	,75	,72					15	2	14	348	
14	—— butt	,62	,61					17	2	0	442	
15	Cowrie top	,56	,56	,68	,64	,75	,67	32	1	0	560	
16	— butt	,27	,27	,43	,43	,5	,48	35	1	0	582	
17	Pune top	,32	,32	,61	,6	,64	,62	35	2	14	632	
18	— butt	,25	,25	,56	,56	,62	,61	37	1	8	658	

Table IV.

Experiments on pieces three inches square, supported on two props four feet distance; weights acting at the middle.

Distinguishing No.	Species of Timber.	Deflection with 15 cwt.	What it recovered by its resilience when the weight was removed.	Deflection with $22\frac{1}{2}$ cwt.	What it recovered by its resilience when the weight was removed.	Deflection after one hour's pressure.	What it recovered by its resilience when the weight was removed.	Weight that the pieces broke with.			Specific gravity.	Remarks.
		ins.	ins.	ins.	ins.	ins.	ins.	cwt	qrs	lbs.		
1	Riga	25	,25	,37	,33	,4	,33	40	1	22	610	The pieces in these expt's. were very dry, and particularly good specimens.
2	Red pine	36	,35	,68	,62	,86	,78	33	3	0	544	
3	Yellow pine	37	,3	,78	,72	1,0	,82	24	2	12	439	Broke after the pressure had continued 15 minutes.
4	Norway	31	,3	,61	,6	,86	,63	29	1	16	517	
5	Scotch pine	62	,6	,93	,9			22	2	0	453	
6	Cowrie	29	,29	,46	,44	,5	,45	36	2	22	579	

Table V.

Specific gravity, relative strength, flexibility, and resilience, of the different timber used in mast making.

Distinguishing No.	Species of timber.	Mean specific gravity. Green.	RELATIVE. Strength.	Deflection.	Resilience.	Mean specific gravity. Dry.
1	Riga top	682	1000	1000	1000	576
2	— butt	754				656
3	Red pine top	647	853	1500	980	544
4	—— butt	741				638
5	American spruce top	627	764	1100	905	541
6	—— butt	678				582
7	Norway top	595	740	1260	860	509
8	— butt	616				520
9	Adriatic top	552	709	864	872	467
10	—— butt	585				493
11	Yellow pine top	562	746	1520	750	430
12	—— butt	665				472
13	Scotch spruce top	475	476	1450	1100	389
14	—— butt	536				440
15	Cowrie top	604	974	920	1086	571
16	— butt	663				619
17	Pune top		1226	978	1146	632
18	— butt					662

The foregoing experiments the writer made to ascertain the principle relative qualities of timber used for the masts of ships. The experiments were made on a larger scale than usual; so that small defects to which they are always liable, could not greatly affect the results. They were also conducted with great attention and care.

The results inserted in these tables are not taken from single experiments, but are the mean results of numerous experiments on the same kinds of timber. The defects common to experiments on specimens of timber, caused by the crossing of the range of fibres, or from the fibres not firmly adhering, render it necessary not only to make the experiments on large specimens, but on a great number of them, and that the pieces should be cut from different trees. For, in the experiments that were made, a piece of Riga, well charged with resin, the specific gravity 821, was found to bear only sixteen cwt.; whereas, a piece of yellow pine, of the same length and size, with its specific gravity 504, was found to bear twenty-five cwt.; a piece of red pine, likewise, with a specific gravity 527, was found to bear only eighteen cwt.; while a piece of Scotch spruce, the specific gravity of which was only 450, was found to bear twenty-five cwt. Now, if a comparison had been drawn from these results, since the experiments were good, and the pieces to appearance equally good, the conclusion would have been that the yellow pine was far superior, in respect to strength, to the Riga, and the Scotch spruce to the red pine; and the same for all the other species of wood upon which the other experiments were made. A like error may likewise be fallen into, on the contrary side, in determining the relative strength by a single experiment: since a piece of Riga was found to bear forty-two cwt. while a piece of yellow pine was found to bear only twelve cwt.; and a piece of red pine thirty-three cwt., while a piece of Scotch spruce was found to bear nine cwt. To have taken, therefore, these experiments for their relative strength, or the extreme for the mean strength, would have given results contrary to what a greater number of experiments has determined; for we find the mean weight that Riga will bear, will lie between thirty-two and thirty-six cwt., yellow pine between twenty-four and twenty-six cwt., red pine between twenty-seven and thirty cwt., and Scotch spruce between thirteen and seventeen cwt.

From these inequalities in timber, the same incorrect conclusions, without repeated experiments, will likewise be drawn in determining the specific gravity, relative deflection, and resilience of the different timbers.

In table V. the different timbers are placed with their relative qualities, taking the Riga at 1000; the qualities are not deduced altogether from the experiments given in the preceding tables, but from a regular series to determine the mean, without taking into account the extremes that, as before stated, are to be found in most kinds of timber.

The Riga, and other timbers, containing a proper quantity of resin, and the red pine, from the fineness and closeness of its grain, and adhesiveness of its fibre, not only maintain their resilience, but strength and flexibility, much longer, even to a very dry state.

The cowrie possesses advantages over most other timbers, from the firmness of its grain, and uniformity of its texture. In all the experiments made upon its strength, both dry and green, it was found commonly to bear thirty-six cwt. and never to bear less than thirty cwt.; while at the same time, the heart appeared equally strong with the outside.

The experiments that have been made on this timber, compared with the Riga, Dantzic, and other esteemed firs, justify a conclusion that it possesses qualities equally good with these timbers, for all the purposes for which they are generally used. The cowrie, by being exposed to the weather, appears less liable to shrink, and stands equally well with them. A piece half an inch thick, and about a foot wide, with a wind shock extending part of the way up from one end, was exposed to the vicissitudes of the weather for more than eighteen months, after which period it was no more shaken, and underwent no other alteration than the sap that was on it to some distance from one edge disappearing, and leaving it with the colour and the firmness of the wood fully elaborated. Most of the cowrie spars that have been brought to England, appear but a little beyond the saplings, since many of the full grown trees are said to exceed thirty feet in girth, and to continue the full size to nearly sixty feet from the ground. Their common diameter is from three to six feet, and their length frequently from ninety to one hundred feet clear or branches.

From the experiments that have been made on the different kinds of timber employed in mast making, and the results of which are confirmed by experience in the use of them, a fair conclusion may be drawn, that timber whose specific gravity does not exceed that of the Riga, and whose strength, tried on pieces of the same dimensions, and under the same circumstances as those in the foregoing experiments, which is found equal to bear twenty-four cwt. with its flexibility and resilience, within the limits of the results in these tables, may be considered suitable for the purposes of mast making, as far as respects these qualities; while its durability may be judged of by close observation on the texture of its fibres, uniformity of growth, and by the quantity and state of the resinous substances it contains.

[*Quoted from Rep. Pat. Inv.*

¶ *Selections from Lectures on Pottery, delivered before the Royal Institution, London, by* A. Aikins, F. L. S. F. G. S.

(Continued from p. 135.)

Tiles, from the purpose to which they are applied, namely, the roofing of houses in order to shoot off the rain, require a texture as compact as can be given to them, consistent with a due regard to economy. The fattest and most unctuous clays are, therefore, those which answer the best, especially if free from gravel and the coarsest sand. The price of the tiles compared with that of brick is such that the

manufacturer can afford to dry them under cover; while, being not more than one-quarter of the thickness of bricks, the drying is more speedily performed, and with far less hazard of warping or cracking: the same also is the case with the baking. Sand is added to the clay, but sparingly, for if, on the one hand, it prevents the ware from warping, yet, on the other, it increases the porosity, which is a fault especially to be avoided. The general manipulations of grinding the clay and tempering it, are analogous to those already described for making bricks; but more pains are bestowed in getting it to the utmost degree of plasticity, so as to allow of its being rolled like dough, into cakes of a proper thickness, which are afterwards brought to the required shape by pressing them into a mould.

The material employed at the manufactories of tiles in the neighbourhood of London, is the bed of blue clay, called by geologists the London clay, or the plastic clay, which lies below the former. The tileries north of the Thames, at Hackney, Clapton Terrace, Hornsey, and Child's Hill near Hampstead, are on the London clay; those near Woolwich are on the plastic clay. The same clay answers well for sugar cones, for garden pots, and all articles of common red ware that do not require to be glazed, and in which a certain degree of porousness is no objection to their use.

If well tempered clay be placed on a horizontal board, to which, by any simple machinery, a movement of rotation on its centre is given, it is evident that a tendency to centrifugal motion will be communicated to the clay, which, though not of itself sufficient to overcome the tenacity of the earth, will extremely facilitate the action of the fingers in forming out of the mere lump, either solids or hollow vessels, of every conceivable variety consistent with the condition that the section of such vessels in any part at right angles to the axis shall be a circle. The board above described, is called the potter's wheel or lathe. By whom it was invented is not known, for in the most ancient records it is spoken of as an implement familiar to every one. The potter's wheel is frequently mentioned in the Jewish writings; and Homer, the most ancient of the Greek authors, has a comparison, the subject of which is a potter turning round with his hands a newly fitted wheel, to see if it runs true. In India, where implements and tools for the manufacturer, are reduced to their utmost possible degree of simplicity, the potter squats on the ground, turning the wheel on its spindle with his feet, while he moulds the clay with his hands. In this country, and I believe in general throughout Europe, the workman turns the wheel by a treadle, as he sits or stands to his work; and, when the article to be made is large and heavy, the motion is given by an assistant working at a vertical wheel. In large establishments where many of these wheels, or lathes, are in use, a steam engine is generally employed as the prime mover. It is impossible to describe by words the facility and quickness with which the clay obeys the hand of the workman, and takes the figure required; it must be seen in order to be truly judged of; and few processes are more entertaining to the bystander, because there are none in which the effect more immediately follows the application of the cause, and in which the

material is so completely under the control of the workman, adapting itself to his taste, his whim, his caprice; in which the form that has been just given, may be annihilated by a touch, and the material may be immediately made to assume its former, or a wholly different figure. No wonder, therefore, that "clay in the hand of the potter," is so often and so impressively used to denote the relative situations of man and of Him who guides and moulds our purposes at his pleasure.

I shall now proceed to give a brief account of the manufacture of the common red pottery ware as practised in the neighbourhood of London, and in various other parts of the kingdom. The material is a yellowish brown clay, from Deptford, there being no other near London on which the glaze will spread with the equality that is required. In general the clay is used without any addition, but such parcels as are too fat or tenacious are brought to a proper state by mixture with loam. The clay is watered and turned, but not being an alluvial clay, contains no stones, and therefore does not require to be washed over. It is finally passed through the pug mill in order to temper it. The required form of a pot or pan, or any other article, is given to it on the wheel, and the ware is dried under cover till it has acquired a considerable solidity. The glaze is then put on in the state of cream, by means of a brush, care being taken to cover the whole surface as evenly as possible: for small articles, such as pipkins, that are glazed only internally, a little of the cream is poured in, and then poured out again, a sufficient quantity of the glaze adhering to the surface of the ware.

The materials of the glaze are galena, commonly called potter's lead ore, ground to an impalpable powder, and then mixed with clay diffused in water, technically called slip. This glaze is transparent, and of a pale yellow colour, and consequently shows through it the colour of the ware; if a black opaque glaze is required, one part of common manganese is added to nine parts of galena. After the glaze is laid on, the ware is again dried, and is then piled in the kiln in order to be burnt or fired. For the first twenty-four hours a very low heat is applied, in order to drive all the moisture out of the ware; it is then exposed for twenty-four hours more to a heat as high as it can bear without fusion, which has the effect of baking the clay, of driving off the sulphur from the lead ore, and of causing the oxide of lead to form a frit or imperfect glass with the clay, the other ingredient of the glaze. The fire is now fed with bavin wood instead of coal, by which the heat is increased, the furnace is filled with flame, and the frit being converted into a perfect glass, flows uniformly over the surface of the ware. The fire is then allowed to go out, and when the furnace has become cool, the contents are removed. If the air has been still during the burning, and due care has been observed, the articles in every part of the kiln will be properly baked; but a high wind always renders the heat very unequal, so that the ware in the windward part of the kiln will not be baked enough, while that in the leeward part will be over-burnt, and run to a slag.

All articles of earthenware which after being baked are opaque, are

more or less porous; and if a heat somewhat approaching to their point of fusion, so as to render them slightly translucent, cannot safely be applied, it is evident that such ware is not very proper for vessels employed in cookery, and for several other purposes, from the difficulty of keeping them clean, and from their liability to crack when set on the fire in a damp state. In England we endeavour to obviate this imperfection by means of a thick vitreous glaze; but as the ware itself is very fusible, the glaze must be still more so; and as oxide of lead forms the cheapest and most fusible glaze, this accordingly is the material universally employed by us. But there is a very serious objection to the use of this glaze, namely, that it is soluble in vinegar, in the juice of most fruits, especially when hot, and also in boiling fat; the consequence of which is, that the food of the lower classes, by whom alone cooking vessels of glazed red ware are employed, is often contaminated with lead, so as seriously to impair their health by occasioning colics, and the other usual effects of lead poison. Possibly borax, which is now a cheap article, and very fusible, might be made to supersede the use of lead; if not, the only way of avoiding this very serious hazard to health, will be the use of more refractory clay, which, consequently, would allow the employment of a less fusible glaze free from lead. This has been done by Mr. Meigh, a potter in Staffordshire, to whom the Society awarded a medal for his invention: the ware produced by him is far superior to that in common use, and well deserves the encouragement of the public. The natives of Peru, as Captain Bagnold informs me from his own personal observation, are in the habit of rendering their earthenware impermeable to water, by rubbing it, when hot, with tallow, which being partly charred, fills up the pores, and at the same time gives the ware a black colour, of which the specimens now before you are examples.

The Etruscan and Greek vases are covered by a black carbonaceous, non-vitreous varnish, which evidently wears off by long handling, and may probably have been produced by a process similar to the Peruvian. The pottery of Samos, which was in great request among the ancients, especially for cooking vessels, has a red covering, seemingly semi-vitreous. Wine and oil jars were rendered by the ancients impenetrable to moisture, as they are at present by the people of Spain and Italy, by rubbing them with wax; but for holding dry substances no glaze or varnish was required. Statues of the gods were in Rome very generally made of terra cotta, that is, of red ware, till the conquests of Sylla, Lucullus, and Pompey, by their large introduction of Greek statues of marble, changed the fashion. Other uses of red ware among the Romans were for tiles and water pipes; and Pliny states, that M. Varro and others directed that their bodies when dead should be deposited in earthenware. A species of ware, somewhat superior to our common red ware, is made at Lambeth, of Maidstone clay, being of a paler colour and a more compact texture than the latter, but does not take a uniform covering by the common glaze for red ware; it is therefore chiefly used for purposes which admit its employment in an unglazed state, or in

situations where the imperfection of the glaze is not perceived, as in ornamented chimney pots, gas consumers, &c.

A more perfect, and indeed very excellent species of earthenware, is that called stone ware, originally introduced from Holland, and now made in several parts of the kingdom, and especially at Lambeth.

The materials are, pipe-clay from Dorcetshire and Devonshire, calcined and ground flint from Staffordshire, and sand from Woolwich and Charlton.

The clay is pulverized and sifted dry, and is either used alone, when an article of great compactness is required, as soda-water bottles, or is mixed with sand to diminish its contraction in the fire. For retorts and other large vessels, instead of sand, the refuse stone ware, ground to a fine powder, is used. For the finer articles, such as figured jugs, ground flint is employed in place of sand. The composition is brought, by the addition of water, to the state of mortar, and is then tempered in the pug-mill. All round articles are made on the horizontal wheel; and those of great size, i. e. of a greater capacity than two gallons, are at first of extraordinary thickness below to support the upper part; when they come off the wheel they are dried, and then put on the wheel again, and shaved down to a proper thickness. For oval, and other figures not circular, as pans for salting hams in, the clay is formed in a mould to the required shape. The drying, especially of large articles, must be very carefully performed; and as, from custom, the tops or bottoms of jars, and various other vessels made of this ware, are required to be of a deeper brown than the natural colour of the materials, they are dipped in a mixture of red ochre and clay slip. When perfectly dry they are piled in the furnace, bits of well sanded clay being put between each piece to prevent them from adhering. A slow fire is kept up for twelve to twenty-four hours, according to the thickness of the ware, capable of bringing it just to a low red heat. The fire is then to be raised till the flame and the ware are of the same colour, and is so to be continued for several hours. At this time the glaze is added, which is done by pouring down the holes in the top of the kiln, twenty or thirty in number, ladles-full of common salt. This, being volatilized by the intense heat of the interior, attaches itself to the outer surface of the ware: here it is decomposed, the muriatic acid flying off, and the soda remaining behind in union with the earth, with which it forms a very thin, but, on the whole, a perfect glaze; at least quite sufficient, with the compactness of the ware, to render it completely proof against the percolation, not only of water, but of the strongest acids. So perfect, indeed, is the texture of the best ware now made, that it has of late been very largely used in the construction of distillatory vessels for manufacturing chemists, instead of green glass, as being more durable, and also cheaper. Pickling jars, and many other vessels in which acid substances for food or condiment are kept, as also those earthen vessels in which great strength is required, are best made of stone ware. Vauxhall is the chief seat of this manufacture.

[TO BE CONTINUED.]

New African Expedition.

The most interesting armament ever despatched from the shores of Britain, has just been equipped at the expense of a few princely merchants of Liverpool. Its objects are to explore and open a commercial intercourse with the heart of Africa by means of the mighty waters of the Niger.

The public are aware that Richard Lander, an obscure and uneducated, but enterprising and intelligent Cornish servant of Captain Clapperton, recently ascertained that the Niger below Boussa, after wandering for four or five hundred miles through the heart of Western Africa, and receiving the contributions of many navigable streams, empties itself into the ocean by several embouchures in that immense bay of the Atlantic called the Gulf of Guinea. The Nun River, by which Lander and his brother descended to the sea, disembogues its waters near Cape Formoso, a promontory separating the Bight of Biafra from the Bight of Benin. From our settlement at Fernando Po, to the Nun river does not exceed 150 miles, so that the importance of our obtaining a footing upon that island is manifest; for, in all probability, the Nun is the principal embouchure of the Niger, though this point is not yet decided. Thus much, however, appears certain, that, entering up this channel, the Niger is navigable for the whole 400 or 500 miles between Boussa and the sea; that though above Boussa the channel is obstructed by a barrier of rocks, yet little doubt exists of its having a communication with Timbuctoo; and, which is of greater consequence in a commercial point of view, that throughout its whole majestic course, the Niger rolls through a fruitful, cultivated, and thickly populated country, studded with towns and villages hitherto unvisited by Europeans, and having no other trade with civilized nations than such imperfect barter as could be carried on across burning deserts, by the agency of slave dealers, and periodical caravans. What a field is here displayed for mercantile adventure! What an opening for extending the trade of Great Britain! What a market for our languishing manufactures! What a means of striking at the heart of the slave trade by introducing civilization and industry across the very route of the principal Caffilas! What a harvest for geographical and other science, in exploring the Niger and its tributary streams! What an opportunity for our missionaries to spread the light of the gospel in the focus of idolatry and superstition! What a glorious chance of converting myriads of heathen nations; and of substituting for ignorance, cruelty, and barbarism, the blessed doctrines of peace, good will, and eternal salvation!

It is with prospects like these, and with a view to secure the advantages in question for our own country, that proposals were made to his majesty's government to take immediate possession of Lander's newly-discovered river. Why this project was not eagerly adopted it is difficult to determine. Finding no disposition on the part of government to assist in appropriating the commerce of Africa,

Mr. Laird, and some other merchants of Liverpool, determined to fit out an expedition at their own expense; and so little encouragement did they receive, that the treasury actually refused to permit the vessels on their return, to land their cargoes duty free. Yet no sooner had Mr. Laird, jr. accomplished the equipment of his squadron, than the Admiralty requested permission to send out a surveyor of their own to take observations, determining latitudes, longitudes, &c. Fortunately for the nation at large, Mr. Laird did not object to this appointment, and Lieutenant Allen, R. N., was selected by the Admiralty hydrographer; an officer whose conciliatory, amiable, and gentlemanly manners, soon secured him the personal regard of Mr. Laird, and of every person on board. Every thing being at length prepared, and Mr. Lander having promised to accompany the expedition, the vessels composing it assembled at Milford Haven as follows:—

Quorra, steam vessel. Having on board Mr. Laird, jr., of Liverpool, as director and supercargo of the squadron.

Sailing Commander, Mr. Harries, Master of the Royal Navy, an officer well acquainted with the coast of Africa.

Lieut. Allen, Surveyor, furnished with numerous instruments for observing the dip, latitudes, longitudes, &c.

Richard Lander, African traveller, and discoverer of the termination of the Niger, acting as guide, adviser, and partly as interpreter to the expedition.

Also, a gentleman of ability, who has volunteered to accompany the expedition as surgeon and naturalist.

The Quorra is 115 feet in length over all; breadth of beam sixteen feet; depth of hold, eight feet; draught of water, with every thing on board for ascending the niger, four feet two inches; tonnage 146, including the engine room. One engine of forty horse power, to be used only in calms, and in ascending rivers. Constructed to burn either coal or wood, as may be required.

Alburkah. So called from an African expression signifying *blessing.* A small steam vessel, built entirely of iron, by Mr. Macgregor Laird, director of the expedition. Fitted with one steam engine of fifteen horse power, constructed to burn wood or coal. Vessel seventy feet in length over all; breadth of beam, thirteen feet two inches; depth of hold, six and a half feet; draught of water when launched only nine inches. With engine in and boiler full, drew two feet six inches; drew four feet six inches on leaving Milford Haven, having provisions and water for twelve men for fifty days, besides ten tons of coal. Bottom of the vessel one-fourth of an inch thick; sides, one-twelfth inch thick. Gross weight when built, and wooden decks laid, sixteen tons, tonnage fifty-six, including engine room. Schooner rigged, like the Quorra. Commanded by Mr. Joseph Hill.

N. B. The greatest interest has been excited about this diminutive vessel, as it is certainly a bold undertaking to navigate the Atlantic in so small a boat, built entirely of iron! She is intended to explore the Tschadda, and other tributary streams of the Niger.

Columbine. Merchant brig of 176 tons. Commanded by Mr.

Miller. This vessel conveys a considerable quantity of coal, and a curious investment of goods for trading with the natives. Her bill of lading would, indeed, have furnished a most ludicrous assortment of articles, from a penny whistle to a kingly crown!

Armament.

Quorra	-	24 pounder swivel-gun,	1
		18 do. do.	1
		4 do.	8
Alburkah	-	9 do. swivel-gun,	1
		Swivels, - -	6
Columbine,	-	6 pounder carronades,	4
		Total,	21 guns.

Besides musquetoons, firelocks, boarding pikes, cutlasses, pistols, &c.

The expedition was detained at Milford several days, waiting the arrival of Mr. Lander, but as the wind blew steadily at north on the 24th of July, Mr. Laird despatched the Columbine and Alburkah for Port Prayah, in the Cape de Verds, that being the first place of rendezvous. A day or two after Mr. Lander arrived, in a fishing boat from Ilfracombe, and in an hour the Quorra put to sea, bearing with her the hearty good wishes of every spectator.

It is Mr. Laird's intention to proceed, in the first instance, to Port Prayah, where he hopes to meet with the commander-in-chief of the African station, who has orders to render him assistance. From thence they go to Cape Coast to take on board some Kroomen negroes, to cut wood in going up the Niger, and dash on at once to Boussa, opening communications for a trade in gold dust, palm oil, and ivory, by the way. The Alburkah will explore meanwhile all the principal tributaries of the Niger, and it is not altogether beyond possibility but she may find a way through the Tcshadda, Shary, or some other river, into lake Tschad, in the centre of the African continent; nay, some flatter themselves with the dream of being able to penetrate into Abysinia, and the Red Sea, by rivers running out of lake Tschad in an easterly direction. What would be the astonishment of the good people of Bombay should this cockle-shell of a vessel—not larger than the boiler of Whitbread's brewery—and built of iron, force her way through the centre of Africa, and so on by the Red Sea, and straits of Bable Mandle, to Socotra, and the coast of Malabar! Let this vision terminate as it may, the attempt deserves success; and that the whole of the spirited individuals by whom it has been undertaken may be rewarded by the fullest realization of their most sanguine hopes, is the sincere prayer of one who with difficulty restrained the desire to quit wife, family, and friends, to embark with the wanderers composing the African expedition.

[*United Service Journal for September.*

Teasel.

The present season has been the most productive in this important article of produce in the west of England ever remembered; and the crops have been harvested in the best possible condition.

The teasel, a species of thistle, (*disacus carduus fullonum*) is propagated by sowing the seeds in March, upon a well prepared soil. About one peck of seed is sufficient for an acre, as the plants must have room to grow, otherwise the heads will not be large enough, nor in great quantity. When the plants come up they must be hoed in the same manner as is practiced for turnips, cutting down all the weeds, and thinning the plants to about eight inches distant, and as they advance, and the weeds begin to grow again, they must be hoed a second time, cutting out the plants to a wider distance, so that they may finally stand a foot apart. The second year they will shoot up heads, which may be cut about the beginning of August. They are then to be tied up in bunches, and set in the sun, if the weather be fair; or if not, in rooms to dry. The common produce is about one hundred and sixty bundles or staffs per acre.

In Essex, the seeds of the teasel, caraway, and coriander, are sometimes sown together early in the spring: the mode of cultivation is rather singular—the farmer engaging with some labourer to share equal profits, the former provides the land, ploughs it, pays all parish rates, and also for the seed; the latter sows it, keeps it clean by frequent hoeings, cuts, threshes, and prepares it for the market. This connexion generally lasts three years, sometimes longer. Mr. Griggs informs us, in his "General View of the Agriculture of Essex," that "in the first year the several seeds come up, and when of sufficient growth are set out with a hoe; and the coriander, which is annual, is ripe before harvest, and produces a return from ten to fourteen hundred weight an acre; in the second year the teasel, most of which will run now, yields a load, or six score staffs, of fifty heads each staff; and the caraways from three to six hundred weight of seed: the third year the teasel declines, and the caraway is in perfection, and will yield an equal bulk with the coriander, and most of the teasel that did not run last season, will produce heads this, and afford a fourth or fifth part of the crop it did the preceding season, by which time the plants are generally exhausted, though a fourth and even a fifth year of caraway, has been known to succeed."

The coriander and caraway must be handled with great care when ripe. Women and children are generally employed to cut it plant by plant, which are afterwards placed in cloths, and commonly threshed on sail cloth in the field. The teasel is also cut by women, who leave a stalk with the head five or six inches in length, by which it is bound in bunches, or gleans, of twenty-five heads each. Fifty gleans make one staff.

The teasel is of singular use in raising the nap upon woollen cloth. For this purpose the heads are fixed round a large broad wheel, which is made to revolve, two men holding the teasel frame, as it is called,

and work the cloth as it hangs up in a vertical position, drawing it down in portions as they proceed. The whole forms an instrument resembling a currycomb, and which is used in a similar manner to draw out all loose ends of the fibres of the wool. [*Rep. Pat. Inv.**

Roofs.

Sheet iron coverings are now universally made use of on all new buildings in Petersburg, Moscow, &c. In the case of a fire no harm can come to a house from sparks falling on a roof of this description. The sheets of this iron covering measure two feet four inches wide by four feet eight inches long, and weigh twelve and a half pounds avoirdupois per sheet, or one pound five ounces each superficial square foot. When the sheets are on the roof, they measure only two feet wide by four feet in length; this is owing to the overlapping. They are first painted on both sides once, and when fixed on the roof, a second coat is given. The common colour is red; but green paint, it is said, will stand twice the time. Small bits or ears are introduced into the laps for nailing the plates on the two inch square laths on which they are secured.

It takes twelve and a half sheets to cover 100 feet, the weight of which is only 150 lbs.; the cost only 35*s*, or about 3*d* per foot.

[*Ibid.*

Progress of Civilization in Egypt.

In Egypt an experiment has lately been made, which will probably have very important effects on the civilization of Egypt and Arabia. Two labouring men, who we believe had been employed near London in boring for water, were taken to Egypt by Mr. Brigs, who was at one time consul at Cairo. They were employed under the patronage of the Pacha, to bore for water in the Desert. At about thirty feet below the surface they found a stratum of sand stone; when they got through that, an abundant supply of water was procured.

The water usually obtained from the surface is of an inferior quality, and for many purposes useless; that which has been obtained by boring is soft and pure. We believe that the experiment has succeeded at every place where it has been made. Already, in the Desert of Suez, a tank, capable of holding 2000 cubic feet of water, had been made, and it is probable that by this time several others have been formed. By this discovery, one great impediment to the fertilizing of this country will be removed. [*Ibid.*

* We have no objection to the use, by the editor of the work just quoted, of our descriptions of patents, or other original articles, or of our translations; but we expect, and require, to have the source from which they are derived acknowledged.—Com. Pub.

¶ Popular Science.

No. II.

Selections from Letters on Natural Magic.
By Sir David Brewster.*

(Continued from p. 144.)

Spectral Illusions.

A few years ago I had occasion to spend some days under the same roof with the lady to whose case I refer. At that time she had seen no spectral illusions, and was acquainted with the subject only from the interesting volume of Dr. Hibbert. In conversing with her about the cause of these apparitions, I mentioned, that if she should ever see such a thing, she might distinguish a genuine ghost existing externally, and seen as an external object, from one created by the mind, by merely pressing one eye, or straining them both so as to see objects double; for in this case, the external object or supposed apparition would invariably be doubled, while the impression on the retina created by the mind would remain single. This observation recurred to her mind when she unfortunately became subject to the same illusions; but she was too well acquainted with their nature to require any such evidence of their mental origin; and the state of agitation which generally accompanies them seems to have prevented her from making the experiment as a matter of curiosity.

1. The first illusion to which Mrs. A. was subject, was one which affected only the ear. On the 26th of December, 1830, about half-past four in the afternoon, she was standing near the fire in the hall, and on the point of going up stairs to dress, when she heard, as she supposed, her husband's voice calling her by name, "—— —— come here! come to me!" She imagined that he was calling at the door to have it opened, but upon going there and opening the door, she was surprised to find no person there. Upon returning to the fire, she again heard the same voice calling out very distinctly and loudly, "—— —— come, come here!" She then opened two other doors of the same room, and upon seeing no person she returned to the fireplace. After a few moments she heard the same voice still calling, "—— —— come to me, come! come away!" in a loud, plaintive, and somewhat impatient tone. She answered as loudly, "Where are you? I don't know where you are;" still imagining that he was somewhere in search of her: but receiving no answer, she shortly went up stairs. On Mr. A.'s return to the house, about half an hour afterwards, she inquired why he called to her so often, and where he was; and she was of course greatly surprised to learn that he had not been near the house at the time. A similar illusion, which excited no particular notice at the time, occurred to Mrs. A. when residing at Florence about ten years before, and when she was in perfect health. When she was undressing after a ball, she heard a

* American edition: published by J. & J. Harper, New York.

voice call her repeatedly by name, and she was at that time unable to account for it.

2. The next illusion which occurred to Mrs. A. was of a more alarming character. On the 30th of December, about four o'clock in the afternoon, Mrs. A. came down stairs into the drawing room, which she had quitted only a few minutes before, and on entering the room she saw her husband, as she supposed, standing with his back to the fire. As he had gone out to take a walk about half an hour before, she was surprised to see him there, and asked him why he had returned so soon. The figure looked fixedly at her with a serious and thoughtful expression of countenance, but did not speak. Supposing that his mind was absorbed in thought, she sat down in an arm-chair near the fire, and within two feet at most of the figure, which she still saw standing before her. As its eyes, however, still continued to be fixed upon her, she said, after the lapse of a few minutes, "Why don't you speak, ———?" The figure immediately moved off towards the window at the farther end of the room, with its eyes still gazing on her, and it passed so very close to her in doing so, that she was struck by the circumstance of hearing no step nor sound, nor feeling her clothes brushed against, nor even any agitation in the air. Although she was now convinced that the figure was not her husband, yet she never for a moment supposed that it was any thing supernatural, and was soon convinced that it was a spectral illusion. As soon as this conviction had established itself in her mind she recollected the experiment which I had suggested, of trying to double the object; but before she was able distinctly to do this, the figure had retreated to the window, where it disappeared. Mrs. A. immediately followed it, shook the curtains and examined the window, the impression having been so distinct and forcible that she was unwilling to believe that it was not a reality. Finding, however, that the figure had no natural means of escape, she was convinced that she had seen a spectral apparition like those recorded in Dr. Hibbert's work, and she consequently felt no alarm or agitation. The appearance was seen in bright daylight, and lasted four or five minutes. When the figure stood close to her it concealed the real objects behind it, and the apparition was fully as vivid as the reality.

3. On these two occasions Mrs. A. was alone, but when the next phantasm appeared, her husband was present. This took place on the 4th of January, 1831. About ten o'clock at night, when Mr. and Mrs. A. were sitting in the drawing room, Mr. A. took up the poker to stir the fire, and when he was in the act of doing this, Mrs. A. exclaimed, "Why there's the cat in the room!" "Where?" asked Mr. A. "There, close to you," she replied. "Where?" he repeated. "Why on the rug, to be sure, between yourself and the coal-scuttle." Mr. A. who had still the poker in his hand, pushed it in the direction mentioned; "Take care," cried Mrs. A., "take care, you are hitting her with the poker." Mr. A. again asked her to point out exactly where she saw the cat. She replied, "Why sitting up there close to your feet on the rug: she is looking at me. It is Kitty—come here Kitty?" There were two cats in the house, one of which went by this name, and they were rarely if ever in the draw-

ing-room. At this time Mrs. A. had no idea that the sight of the cat was an illusion. When she was asked to touch it, she got up for the purpose, and seemed as if she were pursuing something which moved away. She followed a few steps, and then said, "It has gone under the chair." Mr. A. assured her it was an illusion, but she would not believe it. He then lifted up the chair, and Mrs. A. saw nothing more of it. The room was then searched all over, and nothing found in it. There was a dog lying on the hearth, who would have betrayed great uneasiness if a cat had been in the room, but he lay perfectly quiet. In order to be quite certain, Mr. A. rung the bell, and sent for the two cats, both of which were found in the housekeeper's room.

4. About a month after this occurrence, Mrs. A. who had taken a somewhat fatiguing drive during the day, was preparing to go to bed about eleven o'clock at night, and, sitting before the dressing glass, was occupied in arranging her hair. She was in a listless and drowsy state of mind, but fully awake. When her fingers were in active motion among the papillotes, she was suddenly startled by seeing in the mirror the figure of a near relation, who was then in Scotland, and in perfect health. The apparition appeared over her left shoulder, and its eyes met hers in the glass. It was enveloped in grave clothes, closely pinned, as is usual with corpses, round the head and under the chin, and though the eyes were open, the features were solemn and rigid. The dress was evidently a shroud, as Mrs. A. remarked even the punctured pattern usually worked in a peculiar manner round the edges of that garment. Mrs. A. described herself as at the time sensible of a feeling like what we conceive of fascination, compelling her for a time to gaze on this melancholy apparition, which was as distinct and vivid as any reflected reality could be, the light of the candles upon the dressing table appearing to shine fully upon its face. After a few minutes, she turned round to look for the reality of the form over her shoulder, but it was not visible, and it had also disappeared from the glass when she looked again in that direction.

5. In the beginning of March, when Mr. A. had been about a fortnight from home, Mrs. A. frequently heard him moving near her. Nearly every night as she lay awake she distinctly heard sounds like his breathing hard on the pillow by her side, and other sounds such as he might make whilst turning in bed.

7. On the 17th March, Mrs. A. was preparing for bed. She had dismissed her maid, and was sitting with her feet in hot water. Having an excellent memory, she had been thinking upon and repeating to herself a striking passage in the Edinburgh Review, when, on raising her eyes, she saw seated in a large easy chair before her the figure of a deceased friend, the sister of Mr. A. The figure was dressed as had been usual with her, with great neatness, but in a gown of a peculiar kind, such as Mrs. A. had never seen her wear, but exactly such as had been described to her by a common friend as having been worn by Mr. A.'s sister during her last visit to England. Mrs. A. paid particular attention to the dress, air, and appearance of the figure, which sat in an easy attitude in the chair, holding a

handkerchief in one hand. Mrs. A. tried to speak to it, but experienced a difficulty in doing so, and in about three minutes the figure disappeared. About a minute afterward, Mr. A. came into the room, and found Mrs. A. slightly nervous, but fully aware of the delusive nature of the apparition. She described it as having all the colouring and apparent reality of life; and for some hours preceding this and other visions she experienced a peculiar sensation in her eyes, which seemed to be relieved when the vision had ceased.

8. On the 5th October, between one and two o'clock in the morning, Mr. A. was awoke by Mrs. A., who told him that she had just seen the figure of his deceased mother draw aside the bed curtains and appear between them. The dress and the look of the apparition were precisely those in which Mr. A.'s mother had been last seen by Mrs. A. at Paris, in 1824.

9. On the 11th October, when sitting in the drawing room, on one side of the fire-place, she saw the figure of another deceased friend, moving towards her from the window at the farther end of the room. It approached the fireplace, and sat down in the chair opposite. As there were several persons in the room at the time, she describes the idea uppermost in her mind to have been a fear lest they should be alarmed at her staring, in the way she was conscious of doing, at vacancy, and should fancy her intellect disordered. Under the influence of this fear, and recollecting a story of a similar effect in Sir Walter Scott's work on Demonology, which she had lately read, she summoned up the requisite resolution to enable her to cross the space before the fire-place, and seat herself in the same chair with the figure. The apparition remained perfectly distinct till she sat down, as it were, in its lap, when it vanished.

10. On the 26th of the same month, about two P. M., Mrs. A. was sitting in a chair by the window in the same room with her husband. He heard her exclaim, "What have I seen!" and on looking at her, he observed a strange expression in her eyes and countenance. A carriage and four had appeared to her to be driving up the entrance road to the house. As it approached she felt inclined to go up stairs to prepare to receive company, but, as if spell-bound, she was unable to move or speak. The carriage approached, and as it arrived within a few yards of the window, she saw the figures of the postillions and the persons inside take the ghastly appearance of skeletons and other hideous figures. The whole then vanished entirely, when she uttered the above-mentioned exclamation.

12. On the 3d December, about nine, P. M. when Mr. and Mrs. A. were sitting near each other in the drawing room occupied in reading, Mr. A. felt a pressure on his foot. On looking up, he observed Mrs. A.'s eyes fixed with a strong and unnatural stare on a chair about nine or ten feet distant. Upon asking her what she saw, the expression of her countenance changed, and upon recovering herself, she told Mr. A. she had seen his brother, who was alive and well at the moment in London, seated in the opposite chair, but dressed in grave-clothes, and with a ghastly countenance, as if scarcely alive.

Such is a brief account of the various spectral illusions observed

by Mrs. A. In describing them I have used the very words employed by her husband in his communications to me on the subject;* and the reader may be assured that the descriptions are neither heightened by fancy, nor amplified by invention. The high character and intelligence of the lady, and the station of her husband in society, and as a man of learning and science, would authenticate the most marvellous narrative, and satisfy the most scrupulous mind, that the case has been philosophically, as well as faithfully, described. In narrating events which we regard as of a supernatural character, the mind has a strong tendency to give more prominence to what appears to itself the most wonderful; but from the very same cause, when we describe extraordinary and inexplicable phenomena which we believe to be the result of natural causes, the mind is prone to strip them of their most marvellous points, and bring them down to the level of ordinary events. From the very commencement of the spectral illusions seen by Mrs. A both she and her husband were well aware of their nature and origin, and both of them paid the most minute attention to the circumstances which accompanied them, not only with the view of throwing light upon so curious a subject, but for the purpose of ascertaining their connexion with the state of health under which they appeared.

As the spectres seen by Nicolai and others had their origin in bodily indisposition, it becomes interesting to learn the state of Mrs. A.'s health when she was under the influence of these illusions. During the six weeks within which the three first illusions took place, she had been considerably reduced and weakened by a troublesome cough, and the weakness which this occasioned was increased by her being prevented from taking a daily tonic. Her general health has not been strong, and long experience has put it beyond a doubt, that her indisposition arises from a disordered state of the digestive organs. Mrs. A. has naturally a morbidly sensitive imagination, which so painfully affects her corporeal impressions, that the account of any person having suffered severe pain by accident or otherwise, occasionally produces acute twinges of pain in corresponding parts of her person. The account, for example, of the amputation of an arm will produce an instantaneous and severe sense of pain in her own arm. She is subject to talk in her sleep with great fluency, to repeat long passages of poetry, particularly when she is unwell, and even to cap verses for half an hour together, never failing to quote lines beginning with the final letter of the preceding one, till her memory is exhausted.

Although it is not probable that we shall ever be able to understand the actual manner in which a person of sound mind beholds spectral apparitions in the broad light of day, yet we may arrive at such a degree of knowledge on the subject as to satisfy rational curiosity, and to strip the phenomena of every attribute of the marvellous. Even the vision of natural objects presents to us insurmountable difficulties, if we seek to understand the precise part which

* Edinburgh Journal of Science, New Series, No. iv. p. 218, 219; No. vi. p. 44; and No. viii. p. 261.

the mind performs in perceiving them; but the philosopher considers that he has given a satisfactory explanation of vision when he demonstrates that distinct pictures of external objects are painted on the retina, and that this membrane communicates with the brain by means of nerves of the same substance as itself, and of which it is merely an expansion. Here we reach the gulf which human intelligence cannot pass; and if the presumptuous mind of man shall dare to extend its speculations further, it will do it only to evince its incapacity and mortify its pride.

In his admirable work on this subject, Dr. Hibbert has shown that spectral apparitions are nothing more than ideas, or the recollected images of the mind, which in certain states of bodily indisposition have been rendered more vivid than actual impressions; or to use other words, that the pictures in the "mind's eye" are more vivid than the pictures in the body's eye. This principle has been placed by Dr. Hibbert beyond the reach of doubt; but I propose to go much further, and to show that the "mind's eye" is actually the body's eye, and that the retina is the common tablet on which both classes of impressions are painted, and by means of which they receive their visual existence according to the same optical laws. Nor is this true merely in the case of spectral illusions: it holds good of all ideas recalled by the memory or created by the imagination, and may be regarded as a fundamental law in the science of pneumatology.

[TO BE CONTINUED.]

NOTICE.

Proposed Work on M'Adamized Roads.

Mr. John S. Williams, *Engineer*, of Cincinnati, Ohio, has issued proposals for publishing "A practical treatise on M'Adamized roads; together with general observations on the best modes of making and improving other roads."

The work is to contain at least 450 pages, octavo, and to be illustrated by about one hundred drawings, and to be delivered to subscribers at three dollars a copy, bound. As the author cannot assume the risk of publication without such a subscription list as shall insure his safety in this particular, he requests those who are inclined to patronize the work, to send in their names, and to use their influence to induce others to do the same. The Actuary of the Institute, or the Editor of this Journal, will gladly receive and forward to Mr. Williams the names of those willing to subscribe.

The experience of Mr. Williams in the construction of M'Adamized roads has been greater, it is believed, than that of any other individual in this country. The testimonials of his ability, which accompany his prospectus, are of the most honourable character, and are given, in general, by those who have had a full opportunity to become acquainted with his capacity. Among them are the trustees of the Maysville and Lexington turnpike road, whose engineer he was for three years and a half. The president and directors of the Cincinnati, Columbus, and Wooster turnpike company, who attest to

the excellence of the M'Adamized roads, and the beauty and permanence of the bridges constructed by him for them; and other companies also, have furnished similar testimonials. Mr. J. Knight, the chief engineer of the Baltimore and Ohio rail-road, Mr C. W. Wever, the superintendent, and Mr. Andrew Steele, who was for ten years employed in Great Britain under Mr. M'Adam, speak highly of the abilities of Mr. Williams, and of the utility of the work.

The following is proposed as the probable order of treating the subject. Introduction—Road Companies—Charter—By-laws—Engineers—Mapping—Superintendents—Directors—Settings—Contracts—Masonry—Bridging—Graduation—M'Adamizing—Repairs—Tolls—Artificial Roads generally—Substitutes for Stone in the Construction of Artificial Roads—Common Roads—Street Pavements—Wharves—Landings—Ferries—Viaducts—Yards—Walks—Vehicles, &c. &c.

Meteorological Observations for January, 1833.

Moon.	Days.	Therm. Sun-rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	47°	53°	30.00	29.90	50°	SW.	Calm.		Rain—drizzle.
	2	34	43	.20	30 30	30	NW. SE.	do.		Clear day.
	3	35	49	.20	.20	40	SE. S.	Moderate.		Cl'dy. cl'r: halo round moon.
	4	34	54	.20	.10	37	S. SW.	do.	0.2	Clear—rain in night.
	5	42	64	.00	29.90	44	SW. W.	do.		Hazy—clear.
☺	6	49	63	29.80	.70	48	SSW.	do.		Cloudy day.
	7	42	43	.70	.65	25	NW. W.	do.		Cloudy day.
	8	24	30	.65	.65	21	SE. NE.	do.		Cloudy day.
	9	23	38	.60	.50	28	W. SW.	do.		Clear day.
	10	32	28	.45	.45	31	W.	do.	0.2	Light snow—cloudy.
	11	10	17	.70	.70	—3	W.	Blustering.		Clear day.
☾	12	13	24	.90	.95	+6	W.	do.		Clear—flying clouds.
	13	14	32	30.10	30.00		W. SW.	do.		Clear day.
	14	24	38	29.70	29.70	—2	SSW.	do.		Clear day.
	15	18	34	30.05	30.05	20	SE.	do.	1.20	Cloudy—snow in night.
	16	41	42	29.20	29.30	28	SW.	do.		Cloudy—flying clouds.
	17	14	18	30.10	30.20	—2	W.	do.		Clear day.
	18	18	33	.00	29.95	6	SW.	Moderate.		Clear day.
	19	20	26	.20	30.30	12	SE.	do.		Clear—cloudy.
⊗	20	30	42	.20	.10	30	SE. SW.	do.		Cloudy—hazy.
	21	29	36	29.80	29.70	33	SE.	do.		Fog—foggy.
	22	29	39	.70	.70	36	SE.	do.	.14	Heavy fog—hazy—rain.
	23	33	36	.85	.85	37	SE.	Calm.		Fog—cloudy.
	24	33	36	.73	.60	37	SE.	Moderate.	0.4	Drizzle—rain and snow night
	25	31	38	.14	.14	36	SW.	do.		Drizzle—cloudy
	26	22	31	.65	.75	10	W.	Blustering.		Clear day.
	27	28	37	30.00	.90	18	SW. S.	Moderate.		Cloudy—clear.
☽	28	33	43	29.80	.90	21	SW.	do.		Light clouds—lightly cloudy.
	29	24	34	30.05	30.00	16	SE.	Calm.		Cloudy—hazy.
	30	32	40	29.80	29.64	34	SW.	Moderate.		Cloudy—rain.
	31	32	26	.24	.20	32	NE.	Blustering	1.20	Rain—hail—snow.
	Mean	28.71	37.64	29.83	29.80	25.3			2.62	

	Thermometer.	Barometer.
Maximum height during the month,	64. on 5th.	30.30 on 2nd and 19th.
Minimum do. . . .	10. on 11th.	29.14 on 25th.
Mean do. . . .	33.18 . .	29.82

―JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

APRIL, 1833.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Prof. Daniell's Oxy-hydrogen Jet, previously invented and described by Prof. Hare.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—The article of your correspondent, who claims for Professor Hare the invention of his compound blow-pipe, had scarcely appeared, before the number of the London and Edinburgh Journal of Science, subsequent to that to which he refers, reached me, containing, from a high source, viz. Prof. Daniell, of King's College, London, a description of a "new oxy-hydrogen jet." The principle of this jet was clearly explained by Prof. Hare in his paper on the hydrostatic blow-pipe, republished in the 14th volume of Tilloch's Philosophical Magazine; and a more perfect, though a more complex jet, upon the same principle, is figured and described in Hare's Chemical Compendium, published in 1828, the jet having been made as early as 1817.

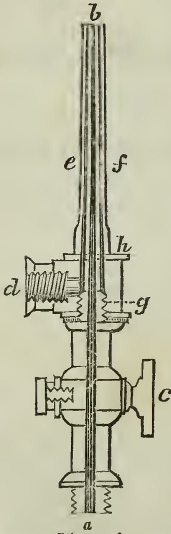
In order to prove these allegations, and to show that Prof. Daniell is only the second inventor of this "new oxy-hydrogen jet," I propose to give you, from the Journal of Science, the description and accompanying sectional figure of the jet; to be followed by the figure and description of that published by Dr. Hare in 1802, and by the more complete execution of the same idea figured and described in his Chemical Compendium.

In thus doing I disclaim any intention to cast a suspicion upon

the fairness of Prof. Daniell; he will, I feel pursuaded, acknowledge that he has been anticipated in this effort of his mechanical skill; my object is to show that this ingenious adaptation of parts in the jet of the compound blow-pipe, belongs to the original inventor of that instrument—to Professor Hare.

Extract from an article entitled "*On a new Oxy-hydrogen Jet, by* J. F. Daniell, *Esq., Prof. Chem. King's College, London.*" London and Edinburgh Journal of Science, and Philosophical Magazine, for January, 1833.

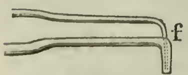
Description of the Jet.



" *a b* is a jet of brass, to be connected, by means of the stopcock *c*, and a flexible leaden pipe, with a gas-holder of oxygen gas. This is fixed by means of a screw, *g*, in the centre of another jet, *e f*, and connected by means of the lateral arm and screw *d*, with another gas-holder of hydrogen gas, or with what is better still, the pipe of a coal gas burner. The second jet thus forms an exterior coating to this first; and when the inflammable gas flows through it, and is ignited at the orifice, a stream of oxygen may be directed into the interior of the flame by means of the latter, with any required degree of force."

I proceed to show that this principle was entirely anticipated in a form of jet used by Dr. Hare prior to 1802, an account of which was given in his "*Memoir on the supply and application of the Blow-pipe;*" read before the Chemical Society of Philadelphia, and published by their order.

Extract from Tilloch's Philosophical Magazine, Lond. vol. xiv. *p.* 303.



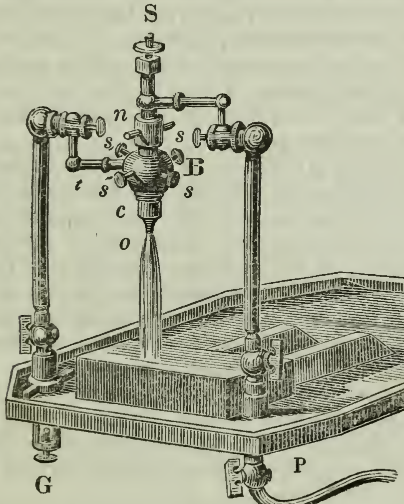
" At *f* are represented pipes which are used for the fusion of platina, or subjects of the largest kind. They consist of a large and a small pipe, the orifice of the one being inserted into that of the other, as may be understood from the dotted line near *f.*"

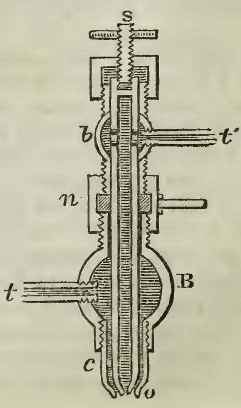
The more perfect form of this jet, the principle remaining the same, is figured on the next page. The view of the entire blow-pipe apparatus, and the description, are taken from Hare's Chemical Compendium, (1828,) page 77. A sectional view of the jet is added, that

its structure may more plainly appear, and the similarity of that of Prof. Daniell to it, be more readily observed.

"*Engraving and description of an improved Compound Blow-pipe and its appendages.*"

"The following figure represents a compound blow-pipe which I contrived and executed myself, about eleven years ago; but, fearing it might be deemed unnecessarily complex, I did not then publish an account of it. Experience has shown, that the complication of its structure does not render it more difficult to use, than the simplest instruments intended for the same purpose; while its parts are peculiarly susceptible of advantageous adjustment.





B, is a brass ball with a vertical perforation, terminating in a male screw above, and in a female screw below. Another perforation, at right angles to this, causes a communication with the tube *t*, which enters the ball at right angles. A similar, but smaller brass ball, may be observed above, with perforations similar to those in the larger ball, and a tube, in like manner, entering it laterally. This ball terminates in a male screw below as well as above. The thread of the lower screw is curved to the left, while that of the screw of

the larger ball, which enters, the same nut, *n*, is curved to the right. Hence the same motion causes the male screws to approach, or recede from, each other, and thus determines the degree of compression given to a cork which is placed between them, in the nut. At S, above the ball, a small screw may be observed, with a milled head. This is connected with a small tube which passes through the cork in the nut, and reaches nearly to the external orifice, *o*, from which the flame is represented as proceeding. This tube is for the most part of brass, but at its lower end terminates in a tube of platina. It communicates by lateral apertures with the cavity of the upper ball, but is prevented by the cork from communicating with the cavity in the other ball. Hence it receives any gas which may be delivered into the upper ball from the lateral pipe which enters that ball, but receives none of the gas which may enter the lower ball, B.

"Into the female screw of the latter, a perforated cylinder of brass, *c*, with a corresponding male screw, is fitted. The perforation in this cylinder forms a continuation of that in the ball, but narrows below, and ends in a small hollow cylinder of platina, which forms the external orifice of the blow-pipe *o*.

"The screws *s s s s*, are to keep, in the axis of the larger ball, the tube which passes through it, from the cavity of the smaller ball. The intermediate nut, by compressing about the tube, the cork which surrounds it, prevents any communication between the cavities in the two balls. By the screw, *S*, in the vertex, the orifice of the central tube may be adjusted to a proper distance from the external orifice. Three different cylinders, and as many central tubes, with platina orifices of different calibres, were provided, so that the flame might be varied in size, agreeably to the object in view.

"I have always deemed it best to transmit the oxygen gas through the tube in the axis, since two volumes of hydrogen being required for one volume of oxygen, the larger ought to be used for the former; and the jet of hydrogen is placed between a jet of oxygen, within it, and the atmospheric air without.

"Under the table is a gallows, G, with a screw for attaching a pipe, leading from a self-regulating reservoir of hydrogen."

Having thus, I trust, satisfied your readers that the allegations which I made in relation to the priority of invention of the concentric jet is correct, I would ask to be indulged in a remark upon Mr. Rutter's blow-pipe alluded to by the correspondent in your last number. I observe that Mr. Rutter alludes to the fact of his placing the gases in two separate vessels, instead of in two compartments in the same vessel, as giving his blow-pipe claims to originality, even though one in which they were separated by a partition, may have been used. Now although the merits of the substitution of two vessels for one effectually divided, as in Dr. Hare's hydrostatic blow-pipe, may be small, I cannot permit him to take to himself even this; for in the figure just given of the compound blow-pipe and its appendages, "the pipe P is the eduction pipe" of the hydrostatic blow-pipe, which "may be supplied, either with oxygen gas, or atmospheric air," and

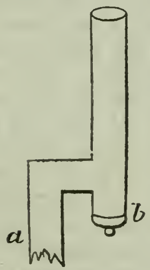
"another pipe, proceeding from a reservoir of hydrogen gas, is attached, by means of the screw and gallows, G, to one of the tubes communicating with the blow-pipe." (Hare's Compendium, p. 78.) So that the oxygen and hydrogen are not supplied from the same reservoir, nor from reservoirs having, necessarily, any connexion with each other.

Although in the original hydrostatic blow-pipe, Prof. Hare used but one partition to divide the gases, soon after two were used by him, and also by Mr. Cloud, whose modification consisting of two separate semicylindrical vessels so placed as to appear like one cylinder, was in operation at Peale's museum for many years. B.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Description of a method of constructing the Flues of Locomotive Steam Engines, by which the escape of sparks will be prevented.

The escape of sparks from the flues of locomotive steam engines is not only a source of much annoyance to passengers, but sometimes, and particularly in a recent accident from this cause, has been productive of considerable loss. By a very simple arrangement of the flue, I have succeeded in obviating these inconveniences. Instead of allowing the pipe *a* to ascend directly up, I make a double elbow in it, as shown in the sketch. The upper section of the ascending pipe is continued down below the elbow, and is closed at bottom by a moveable cover *b*. All the larger particles of ignited matter which would otherwise escape in the form of sparks, fall into this chamber below the elbow, and any ashes which accumulate therein may be removed at pleasure. Should any sparks escape from the flue, a circumstance which rarely happens, they will be so minute as to burn out immediately, and produce no annoyance.



EBENEZER A. LESTER.

Boston, Massachusetts, March 1, 1833.

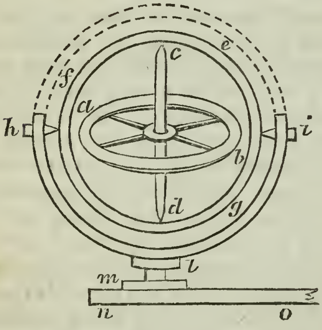
FRANKLIN INSTITUTE.

Monthly Meeting for Conversation on Mechanical Subjects.
February, 1833.

At this meeting Mr. Rufus Tyler repeated the experiments made by him some years since, (in 1827–28,) on the effects of centrifugal force on bodies in rotation upon pivots. He first used a wheel, or disc, having a pin in the centre, acting in the manner of the common top, which, when made to spin upon the point of the pin, by striking the edge with a wide strip of leather, was made to ascend an inclin-

ed plane of iron, and lodge itself in a depression near the top. The inclined plane being attached to a whirling table, he showed that the motion of the table in the contrary direction from that of the top rendered the movement of the latter steady, although the velocity was considerably increased, the top inclining inwards in proportion to the increased velocity, while a rotation of the table in the direction of the top caused the top to dip *forward* and *outward* in its orbit, and ultimately to fly off.

The second consisted of a ring, (more properly a fly wheel,) like the first, having an axis passing through its centre and perpendicular to its plane, equal in length both ways from the plane; by means of the two pivots in which this axis terminated, the disc was suspended in an iron ring; this ring was itself suspended upon two pivots attached to another ring, the line joining these pivots being at right angles to the line of the axis of the disc; the last ring was fastened by a stem to the whirling table. A better idea may be formed of the apparatus by referring to the annexed sketch, in which *ab* is the inner ring, or disc, *cd* its axis, *c* and *d* being the pivots by which it rests in the second ring *efg;* this ring *efg* is hung upon the pivots *h* and *i* in the exterior ring *hli*, (half of which was cut off, since the first experiments,) and which is connected by the stem *lm* to the whirling table *no.* Motion was given to the disc *ab* by dexterously rubbing the axis with a stick. The table being moved in the same direction with the revolving disc, the latter remained in a position nearly horizontal, while the least motion in an opposite direction caused it to overturn, reversing the ends *c* and *d*. The ring *efg* was heavier on the lower side of its axis of suspension, *hi*, than on the upper side. These experiments elicited considerable discussion as to the causes of the effects observed.



Mr. Tyler claimed to have made these experiments and repeated them before different members of the Institute, (Dr. Thomas P. Jones, Dr. R. M. Patterson, Prof. W. R. Johnson, and James P. Espy, Esq.) before the apparatus called Laplace's, for showing the precession of the equinoxes, was introduced into the city, and before the Rotascope described in the eighth volume of the Journal of the Institute was brought before the public.

Mr. Reuben Gilbert submitted a horizontorium, or horizontal perspective, view of St. Stephen's church in Tenth street. This was critically examined, and gave rise to explanations of the general principles of this kind of perspective. The different views of those present were brought to bear upon the theory of this branch of art.

A moveable diagram of the steam engine, a drawing of the new fire engine of the Pennsylvania fire company, and a measuring gauge by Asa Spencer were placed upon the tables, but so much time had been devoted to other objects that the explanation and examination of them was deferred.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN OCTOBER, 1832.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in *Fire Arms;* Philip A. Morineau, city of Philadelphia; an alien who has resided two years in the United States, October 10.

The improvements claimed in this patent are intended, principally, for muskets, fowling pieces, and other guns of that description. In the general construction, these guns resemble some others which have recently been invented in France, but the patentee claims to have made a much better arrangement of the parts, and it is upon this that he founds his claims.

The gun is loaded at the breech, which is, for this purpose, made to revolve upon lateral trunnions. When the cartridge, with its percussion primer, has been inserted in its place, the breech in being turned round cocks the gun. The bayonet is fixed in a more convenient manner than upon the old musket, the absence of a ram-rod affording an opportunity so to do.

The advantages which this gun is said to possess over others, are that it may be loaded and discharged in any position, and with increased celerity; that it has less recoil; that it is secured against damp and wet; that it is not liable to become foul, and is readily cleaned; that its construction is more simple; that it requires no ram-rod, with its appendages; that it is cocked and primed by the operation of loading; and that the bayonet is more readily and conveniently fixed.

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2. For a machine for *Hulling Clover and Cleaning Wheat;* George Faber, Chambersburg, and Edward Faber, Pittsburg, Pennsylvania, October 13.

(See specification.)

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3. For *Propelling Locomotive Rail-way Cars up Inclined Planes*, by means of cog wheels on the ends of the crank axle; William Bent, City of Philadelphia, October 25.

The claim of the patentee is to the "having cog wheels on the ends of the crank axle, and racks for them to run on, on the top of an elevated rail-way, outside of the common rail-way, so as not to interfere with the body of the locomotive carriage."

This claim will render the nature of the thing patented sufficiently evident. The elevated rail-ways, are, of course, to raise the ordinary wheels above the rail upon which they would otherwise run; and the power gained will be in proportion to the diminution of speed from the small diameter of the cog wheels. Where there are elevations of different degrees, it is proposed to have two or more cog wheels, with corresponding rails and racks.

The ascending of inclined planes upon this principle is no new idea, as might be readily shown by reference both to English and American publications; we need not, in fact, travel out of the pages of this journal for the necessary evidence. We will cite one example only. In the September No. for 1826, there is the specification of a patent granted to Major, now Colonel, S. H. Long, for "improvements in locomotive engines, and in the mode of transferring loaded carriages from one level to another." One of the improvements consists in "a pinion to be added to each axle, to act upon a rack, or toothed rail, located midway of the rail track of each inclined plane."

When this pinion engaged with the rack, the ordinary wheel still rested upon the rails, but turned freely upon their axes, leaving the whole mechanical effect of the engine to operate upon the pinion, and thus to diminish the velocity of ascent in any assignable degree; a principle precisely the same as that now proposed to be applied.

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4. For an *Instrument for Setting Boxes in the Hubs of Wheels;* Jeremiah Chancey, Chesterville, Kennebeck, county, Maine, October 25.

The instrument here patented is intended for cutting the ends of hubs to fit boxes of various sizes. A block of wood, called a guide, may be made cylindrical, and about six inches in length; its diameter must be something greater than that of the largest box intended to be set by it. This block is bored through its centre, so as to receive a cylindrical shaft, or shank, as large as the smallest box intended to be set. On one end of this shaft there is a handle, like an auger handle, and on the other there is a cutter, which is fixed on the end of the shaft by a screw nut, allowing it to be set to cut a hole of any required size. The shaft must be at least as much longer than the guide as the depth of the box to be set, and must turn freely in it. On the lower end of the guide there is a flanch, perforated, to lie on the end of the hub, and to be attached to it by nails, or otherwise, during the operation of cutting.

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5. For an *Improvement in the Bush of the Bedstone of a Grist Mill;* William Bennet, Chesterville, Kennebeck county, Maine, October 25.

The object of this contrivance appears to be to adjust the bearings against the sides of the spindles by screws and wedges, and to give an opportunity of regulating, or lubricating it without taking up the runner. The description is not very clear, nor does the thing appear

to be of sufficient importance to demand, and compensate for, the labour of attempting to make it so.

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6. For a *Method of supplying Houses with Water;* William Bryant, Davidson county, Tennessee, October 25.

An elevated rail-way is to extend from the house to the reservoir containing the water. The box, or vessel, in which the water is to be conveyed hangs below the rail, being attached to a small carriage with wheels which run upon the rail. At the house there is to be a wheel and axle, turning by means of a crank, a rope from which, affixed to the vessel, is of sufficient length to allow it to descend to the reservoir; if the inclination is sufficient it will descend by its own gravity, otherwise the rope must be of double length, and pass round a pulley at the reservoir. The bottom of the vessel is furnished with a valve opening inwards, admitting the water when it dips into the reservoir. The claim is to "the principle of supplying houses with water by means of a rail-way and carriage, and the application of a rail-way and carriage to that purpose, whilst the person conveying the water remains at the house to which it is conveyed."

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7. For an *Improvement in Carding Machines;* Robert Bartlet, Ripley, Browne county, Ohio, October 25.

This patent is for a variation in the mode of working the comb in the carding machine; the description does not inform us, in what point it is superior to the methods now in use, nor can we discover it; without a drawing we cannot enable others to judge upon this point.

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8. For an *Improvement in the Cultivator, or Harrow;* Waldron Beach, city of Philadelphia, October 25.

The improvement for which this patent is obtained, consists in what the inventor calls a "two winged shifting tooth." The cutting part is made with two points at opposite ends, both exactly alike, in order that if one point breaks, or wears out, the other may take its place. To accomplish this, the tooth is made separate from the shank by which it is attached to the frame; and has a pin on its centre by which it may be fastened to said shank.

A longitudinal groove upon the shifting tooth, adapted to the fixing of it securely, is also described and claimed; and it is declared that these improvements render the tooth stronger, and more convenient and durable than those of the old construction.

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9. For an improvement in the *Machinery for manufacturing Paper;* patented by John Ames, Springfield, Massachusetts, May 14, 1822. Patent surrendered, cancelled, and reissued under an amended specification, October 25, 1832.

In the original specification, a very general and imperfect description of the machinery was given, without the slightest intimation of what was considered by the patentee as his improvement. The ma-

chine is of the cylinder kind first invented in France, and which has since undergone many improvements there, as well as in England and in this country; and by the amended specification it appears that the invention of the patentee consisted in the particular way in which he constructed his cylinder, his claims being in the following words,—"What I claim as new, and as my invention, is the construction and use of the peculiar kind of cylinder above described, and the several parts thereof in combination for the purpose aforesaid."

This apparatus having been long in use, and well known, we do not consider it as necessary to describe the cylinder as it is constructed by Mr. Ames.

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10. For an improvement in the *Common Grate for Burning Coal;* James Atwater, New Haven, Connecticut, October 25.

In this grate, which is intended for burning anthracite, there are to be registers or sliding shutters, made of soap stone, iron, or other material, which are to be furnished with chains passing over pulleys, and weights to counterpoise them. Sometimes there may be but one of these slides, but at others it is proposed to use two, and to hang them in such a way that they may direct the draft upwards or downwards. The back of the grate is to be hollow, and several pipes or openings may be used for the escape of air; the pipes, or flues, may also be made to return upwards and downwards so as to expose a large surface to emit heat. The claims are to "the invention of a fire grate with several openings or flues in the back, and behind the fuel, combined with a chamber in the rear of the grate, and a door below the grate opening into the chamber. The construction and adaptation of one or more gates, or slides, to a grate with several openings, or flues, in the back thereof, so as to be able to alter or change the draft of the grate by making it draw upward or downward, or horizontally; and so as to be able to close the whole or any part of the openings or flues, as may be required, at pleasure. And to the exclusive right to regulate the draft of a grate with an open back by means of one or more gates, or slides, as aforesaid."

We think that there are more contrivances about this affair than will be found to be either convenient or useful, leaving elegance altogether out of the question. We also think that the claims are too general and indefinite, and are likely, therefore, to interfere, or rather to be interfered with, by things which have been already and frequently done.

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11. For an improved mode of *Manufacturing oval and other Axes;* Ashael Collins, Winstead, Litchfield county, Connecticut, October 25.

(See specification.)

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12. For a *Machine for Shelling Corn;* Michael Carpenter, Lancaster, Lancaster county, Pennsylvania, October 25.

This shelling machine differs considerably in its construction from

any of those which we have heretofore noticed, and we have no doubt that it will work well. A wheel of about a foot in diameter, and four inches in thickness, is made to run horizontally. The periphery of this wheel is set round with iron teeth. One, two, or more smaller wheels, say of three inches diameter in the larger part, but turned somewhat conical, and set with teeth, revolve horizontally near to the periphery of the first wheel; they are so fixed that their distance from it will vary according to the size of the ear of corn. A board called a shelling board, is also so arranged as to aid in the feeding of the corn; this operation is effected by dropping the ear in endways through a tube, or tubes, on the top of the machine, which conducts it to the proper place. A riddle and fan are placed under the shelling apparatus.

The whole machine is described with much care and intelligence, but no part is designated as the foundation of a claim to a patent, and in this particular, therefore, the demands of the patent law are not fulfilled. The riddle and fan make as conspicuous a figure in the specification as those parts which are really new. Precise measures are also given of those parts the size of which may be much varied without injury to the operation, a fault which, if not fatal, is at least dangerous, as where nothing is specially claimed, every thing is to be considered as included in the patent.

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13. For an improvement in *Cutting Pliers;* Russel Curtis, Springfield, Hampden county, Massachusetts, October 25.

The improvement here claimed consists in the insertion of steel cutting dies, in dovetail grooves prepared for the purpose, instead of making the cutting part in one piece with the pliers. Different forms of pliers, and places for the insertion of the dies are referred to in the description, but the foregoing is the essential point of the invention. Although a simple, we think it a very good thing; in point of principle it is not new, but it may be so in its application to pliers.

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14. For an improvement in the *Churn;* Anthony W. Carrol, Granville, Licking county, Ohio, October 25.

The claim in this churn is to the formation of the dasher, and the manner in which it is made to revolve, and we believe that there is really something new in it, which is rarely the case with patented churns. Whether the novelty will produce advantages which will compensate for the complexity of the machine, we are not prepared to say. The dasher consists of two distinct parts, which are made to revolve in reversed directions in a vertical churn. One part of the dasher is in the form of a frame, which nearly fits the sides of the tub. Slats, set into this frame, project from it towards the centre. The frame is attached to a hollow shaft which passes up through the cover of the tub. A cylindrical shaft passes through this hollow shaft, rising above it, and its lower end occupying the centre of the tub; this has slats upon it which pass between those on the frame. Upon the hollow shaft, just above the lid of the tub, there are cogs which

form a pinion, and upon the cylindrical shaft, at its upper end, there is also a pinion. A vertical crown wheel, taking into these two pinions, causes the two parts composing the dasher, to revolve in opposite directions.

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15. For an improvement in the *Percussion Lock;* David G. Colburn, Port Byron, Gayuga county, New York, October 25.

This, so called, improvement, consists, we are told, of four different plans, which are little more than named, nothing like a description of them appearing. In the drawing, a particular arrangement of the parts of the lock is represented, the advantages of which we are unable to put upon record, as we do not perçeive them.

There is no claim made.

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16. For an improvement in the mode of using *Water Proof Stiffening for Hats;* George W. Downs, Circleville, Pickaway county, Ohio, October 25.

A patent for stiffening hats by shellac dissolved in an alkali, which was to be afterwards neutralized by sulphuric acid, was obtained by Stephen Hempstead, jr. on the 26th of October, 1827; and this also is the process described in the specification before us. If Hempstead's claim is good, the present patent would be a violation of his right, even admitting that it contains a real improvement upon it, as it includes the same principle of operation.

To one pound of shellac four ounces of common rosin are to be added, and these are to be boiled with two ounces of pearlash in a gallon of water, until dissolved. The peculiar advantage of rosin, is said to be its cheapness, and we apprehend that it is the only advantage, as rosin, when combined with shellac, impairs its hardness, rendering it brittle, and crumbly.

Those hat bodies which have not been sized in vitriol, must be immersed in it before stiffening, and this is not to be soaked out, (as directed by Hempstead,) previously to this operation. When the stiffening begins to acquire elasticity by drying, the bodies are again to be put into vitriol water, as strong as that prepared for sizing.

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17. For an improvement in the *Machine for Gumming Mill Saws;* Jeremiah Case, Sodus, Wayne county, New York, October 25.

This is so much like the machines which we have previously described, most, if not all, of which possess little claim to novelty, that we have no more inclination to attempt a new description of it, than we should have to read "An act to amend and explain an act entitled an act to amend and explain an act entitled an act, in addition to an act, to regulate and establish the doing of certain things which have heretofore been regulated and established without any difficulty whatever."

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18. For an improvement in the *Construction of Boats and*

other Vessels; Albert Dorman, Norfolk, Norfolk county, Virginia, October 25.

This boat is to have a perfectly flat bottom, and with it the sides and stern are to form right angles; the fore part, or stem, is to form an angle of about 135 degrees; with this exception, the whole structure is a rectangular parallelogram, or in the vernacular dialect, an oblong square box. As in such a vessel, a rudder fixed in the ordinary place would have but little hold upon the water, and little water to hold upon, there are to be two rudders, one at each angle of the stern, moved simultaneously by one tiller. The bowsprit is to be fixed in the manner of those hinged masts, which are made to pass under bridges, the hinge joint being near to the foremast, against which it may be drawn up by a block and tackle. The claim is to "the before described mode of constructing boats and other vessels."

We apprehend that the antediluvian records of naval architecture were all destroyed in the Noachian flood, and that the celebrated ark which saved nothing but living beings, is the first vessel of whose form we have any authentic particulars. But for this, we have no doubt that certificates might be obtained of most of those who lived nine hundred and odd years, and begat sons and daughters, to the antiquity, and perhaps, so far as they knew, to the utility, of this rectangular mode of constructing boats and other vessels. It is most probable also that the

> ". . . . . . Adventurous he
> Who in the first ship broke the unknown sea,"

would inform us that he had made a safe and successful voyage in a vessel which was rectangular in all its parts, but that he had afterwards improved it by sharpening the bow, so as to present an angle of 135, or some other number of degrees, to the resisting element; and that he had taken a patent for his improvement, which, however, had expired A. M. 15.

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19. For an improvement in the *Planing Machine;* Thomas F. Fuller, Bristol, Hartford county, Connecticut, October 25.

The machine here described is to be applied to the planing and preparing wheel stuffs, plates, and faces, for making and manufacturing wooden wheeled clocks." A planing machine constructed, generally, in the manner of that described, is mentioned as having been previously in use. The plane is worked on a bed by a crank motion, and the stuff borne up against it from below. In the improved machine, a particular construction of this part of it constitutes one of its novelties; another is the mode of holding the stuff, and a third the shifting of it laterally, so that it may plane a piece of greater width than the jointer, which, it seems, was not the case with the old machine.

The points claimed are "the moveable slide or carriage by means of which the board, or other thing to be planed, can readily be moved under the plane or jointer, and sideways with it; and all that part of

the machine necessary to the convenient use of the slides, that is to say," &c. &c.

The moving of the stuff sideways under a plane worked in the manner described, is not in itself new. We have noticed other machines for planing stuff, in which this lateral motion was given; if, therefore, the present patentee can sustain his claim, he must depend, not upon the thing done, but upon his own particular mode of accomplishing it.

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20. For improvements in the mode of *Manufacturing Salt*, for which a patent was obtained on the 9th of September, 1825; Calvin Geuteau, Geddes, Town of Selina, Onondaga county, New York, October 25.

The former specification is recapitulated in the papers applying for the new patent. This specification states that the invention consisted of three wooden vats, with boilers attached to each, and placed side by side. Two of the vats were for cleansing the water; and when cleansed it was to be drawn off into the third, which was the middle vat, in which it was made into salt. The settling vats were covered, but had small openings at their ends to let off the steam. The middle vat was also covered to a considerable distance, in order to prevent the escape of heat during boiling; and was so extended in length, that the salt when formed on its surface might be carried by the current of heat towards the colder end of the vat and there deposited.

The boilers were from twelve to twenty feet in length, and three in diameter. One end of each boiler was open, and fitted into the vats, so that the water flowed freely from one to the other. The boiler was built up in a proper arch with fireplace, flues, &c. Into the two settling vats, when sufficiently heated, quick lime was to be thrown, which would cause the impurities to settle, with itself, to the bottom of the vat.

The specification of the improvement states that there is to be a wooden vat forty or fifty feet long, ten or twelve wide, and from five to five and a half deep, having a partition along its centre from front to rear, secured by caulking, and strongly supported. The whole is to be covered with plank, so as to confine the steam. Two doors are left through the cover, near the front, and two near the rear, to be opened when requisite.

There are to be cylindrical boilers, as before, but differing somewhat in their construction, and in the manner of setting them, both of which are particularly described. The boilers have iron pans fitted to them, and these are made so that they can be drawn out to remove the matter deposited in them. They are also to have man holes in front, in the manner of ordinary steam boilers. Steam boxes are made to pass along each division of the vat; a description of the construction and management of these would require more space than it would be generally desired should be given to it, particularly without the drawings required to make it plain: leaving, therefore, this

and some other parts, we will proceed at once to the claims of the patentee. These are to "the peculiar construction of the cylinder, and the application of it to boiling crude salt water, and the sheet iron pan placed inside of the same. The manner of setting the cylinder in the wall, grates, flues, &c. The manner of boiling in wooden vats, and their construction. The side vats, and saturating with a stream of boiling salt water, running on to salt, and separating the impurities in the side vat, and passing the pure brine to the salting vat. The manner of applying the steam to make salt, with wooden boxes and metallic covers, and the boxes at the end of the steam boxes regulated by a door, or slide, to retain the heat and prevent atmospheric pressure. The manner of turning the steam on one vat, or both, as occasion requires."

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21. For a *Composition for Painting, and for Lubricating the Ways for the Launching of Vessels;* Whitman Mead, Greenwich, Fairfield county, Connecticut, October 25.

We are told to take soap stone, or antinolite, to reduce it to a fine powder, and then to mix it with oil of any description, viz. whale, fish, linseed, sperm, olive, or any other; and, in order to produce a variety of colours, we must add whatever may be requisite. The pulverized soap stone is also to be mixed with tar, pitch, varnish, or resin, to cover the sides and decks of vessels. This is the sum and substance of the specification.

We apprehend that instead of *antinolite*, the patentee intended steatite, of which soap stone is a variety. Soap stone has been employed for lessening friction in machinery, whether it has ever been used to give a body to paint we are not informed. What may be its good properties when so employed can be judged of from experience alone, and whether or not the patentee has had any opportunities of informing himself in this particular, he has not told us.. Should it prove to be more durable than any other article which is equally cheap, it may come into use, but otherwise we apprehend that the patent will prove to be a dead letter.

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22. For *Medicine for the cure of Cholera and other diseases;* Jacob Houck, Baltimore, Maryland, October 25.

A list of formidable diseases is given in the caption of this specification, which are to yield to this newly discovered medicine; these diseases are cholera, bilious or cramp colic, wind in the stomach or bowels, diarrhœa, dysentery, cholera morbus, rheumatism, gout, spasms, or fits, cramps, ague and fever, and the nightmare. The medicine consists of gum guac, juniper oil, and rye whiskey in equal proportions; a table-spoonful of a mixture of which, with an equal portion of water, is to be taken whenever any premonitory symptoms are felt, and to be repeated in half an hour should the first not be effectual. If the pain is severe, double the dose, and repeat it in two hours. When the pain is relieved take fifteen grains of calomel, and after this, a dose of oil.

No further instructions are given in the specification, and we are at a loss to know how the foregoing can be applied to the symptoms of nightmare, which seldom troubles us in our waking hours, or to some other of the disorders named.

As regards the application of this medicine in spasmodic cholera, we have no doubt that it would be equally efficacious with a number of the nostrums administered by empirics in that fatal disease; we most sincerely hope, however, that the patentee may never have an opportunity of testing its virtues in this instance, and that if he should, the patient may reject the medicine, and dismiss the *doctor*.

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23. For an improvement in *Lamps for Burning Compound Spirits or Oil;* William Magee, city of New York, October 25.

There is some difficulty in guessing, from the specification and drawings, in what consist the improvements which are intended to be patented, although, in the latter, there are eight different forms of this lamp represented. The general construction is that of the Argand's lamp, with glass burners. A conical piece, which may be raised or lowered, occupies the places of the button, or disc, which is sometimes used to force the supply of air through the centre tube against the wick. The draft on the outside of the circular wick is also to be directed towards the flame by a hollow, truncated cone, or inverted funnel, which surrounds it. There is not in this specification any thing which we can torture into a claim.

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24. For a *Machine for Extracting the Stumps of Trees;* John E. Larkin, Salem, Washington county, New York, October 25.

We have here the inspirations of the same genius which presided at the period of the invention of some of the predecessors of this stump extractor. A rope is to be wound round a drum, which is fixed upon a shaft in the frame work of the machine, and the power is to be derived from the drawing of this rope by horses, or other animals. An endless screw upon the shaft of this drum takes into a pinion on a second shaft, around which is to be wound a chain that is attached to the stump to be raised. The frame of the machine is to be moored to stumps, or to other suitable, fixed objects.

The claim is to "the before described machine, particularly the mode in which the endless screw is applied for that purpose."

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25. For *Machinery for Hammering or Hardening Taps, or Soles, for Shoes and Boots;* Stillman Knowlton, Athol, Worcester county, Massachusetts, October 25.

Instead of hammering the leather, it is to be passed between two rollers, one placed above the other like the rollers of a flatting mill; the rollers are not to be cylindrical, but one of them, the upper, is to be concave, and the other convex, so that the leather, when rolled, shall be in a proper shape for the last. The gudgeons of the lower roller, raise by a moveable lever, and it is forced against the upper

roller by placing the foot upon a treadle; a spiral spring relieving it when the foot is removed. The operator places one end of the leather between the rollers, puts his foot on the treadle, and then, with his right hand, turns a crank, which by means of wheels and pinions gives motion to the rollers. The leather, it is observed, may be hardened to any degree, according to the will of the operator, and one man can perform as much work as ten in the usual way.

The claim is to "the position of the rollers, the one being placed above the other, and the application of the spiral spring." If this machine is new, and operates as well as it is said to do, and we see no reason why it should not, we think the claim most palpably defective. The rollers might with equal advantage be placed side by side, and the effect of the spiral spring rendered unnecessary by other contrivances. The claim, it seems to us, should have been to the rolling of leather for soles, between rollers of the kind described, instead of hammering them, as has been heretofore done; one of the rollers being so fixed as to admit of its being forced against the other by means of levers, or other suitable contrivances.

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26. For the *Adaptation of the Anthracite Coal Stove to open Fireplaces;* Eliphalet Nott, Schenectady, New York, October 25.

This improvement is said to be "applicable to stoves and furnaces of every sort; whilst the friction of the rotary grate is diminished, the durability of the vertical grate increased, the escape of gas and ashes prevented, the ventilation of the room provided for, and the consumption of fuel diminished."

We noticed at p. 172 and 173, two patents for improvements in the apparatus for burning anthracite, issued upon amended specifications; the present patent is an original, in which the general principles adopted in the former stoves, are applied to those used in open fireplaces.

As in the former instance we were unable to give a full description without engravings, so also in the present we must content ourselves by stating that the adaptation to grates, of those principles which have been approved in the stoves, appear to be managed with much skill, and the models and drawings in the patent office represent structures which are ornamental, and have also some claim to elegance.

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27. For *Manufacturing Nails of various descriptions;* Freeman Palmer, Buffaloe, Erie county, New York, October 25.

The object to be accomplished by the machinery used by the patentee, is the cutting of nails from rolled iron, so that the grain of the iron shall run with the length of the nail. Rollers are to be prepared, which are grooved longitudinally in such a way that iron rolled through them will have the head, and the wedge form of the nail, or brad, formed on one or both sides of it, as the case may be. The part to form the heads of two nails stand together, with divisions between them produced by ridges on the rollers. The plate thus rolled

is then to be cut into strips crosswise; the length of one or two nails determining the width of the strips. A common nail cutting machine is then used to cut these strips in the usual way, the cutters, however, being so formed as to adapt them to the shape given to the strips by rolling. The patentee says—

"This invention, or discovery, of a *new application* of machinery, now in use, for manufacturing cut nails, to a *new* purpose, viz. that of cutting flexible nails, or such as may be clenched, and will answer the purpose of wrought nails, I specifically claim as my own."

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28. For *Machinery for Propelling Boats;* James King, Ogden, Monroe county, New York, October 28.

There are some endless things which soon come to an end, and such we apprehend will be the case with the endless chain of buckets by means of which the present patentee proposes to propel canal and other boats.

The boat is to be of the kind called a twin boat, having two keels, with a space between them along which the buckets are to pass. Two drums, one at the stem and the other at the stern, are to have endless chains, composed of flat links, passing round them, and to these the buckets are to be attached, and properly braced. Those buckets which are out of the water pass through a trunk above the deck. Motion is to be given to the chain by applying the power of steam to the drum at the stern.

The same apparatus is to be applied to current mills, &c.; there, however, is no claim made to it for either use, that having been previously done, on more than one occasion.

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29. For a *Thrashing Machine;* Squire Gambell, Onondaga, Onondaga county, New York, October 25.

It is really some time since we have encountered a thrashing machine among the patents, and the holiday has been quite a refreshing one. We shall not, it is true, have much trouble with the one now before us, having so frequently met with, and disposed of the like. All we need say of it is, that there is to be the usual cylinder and concave bed, and that these may be made in a variety of ways, leaving great latitude of choice to the maker. We think the patent secure against infringement, as it merely tells us what we may do, and not what we are to avoid, and the things permitted having been before done, may again be ventured upon, without fear.

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30. For a *Cheese Press;* Benjamin Hinkley, Fayette, Kennebeck county, Maine, October 25.

The bed upon which the cheese is placed is made to rise so that its pressure may be effected between this raising bed, or follower, and the cross piece which connects the two cheeks of the press. A piece descends from the under side of the follower, between two rollers which cross the press from side to side near its bottom. These rollers have their bearings in the cheeks of the press, and one of them has holes made in it to receive a handspike, or lever, which acts upon

it in the manner of a common windlass. A rope is inserted in the rollers by one end, and the other is affixed to the lower end of the stem, or piece, above mentioned, in consequence of which when the roller is turned by means of the lever, the follower is forced up. To cause the rollers on either side of the press to act simultaneously, they are furnished with whirls upon their ends, which are connected by a leather strap in such a way that they concur in raising the follower. A rag wheel and pall at the opposite end hold the rollers in their places.

The patentee claims the particular mode of uniting the pulleys and rollers, and their connexion with the follower; likewise the arrangement of the several parts in the way described, as constituting a new combination for effecting the purpose intended.

We believe the arrangement of the parts to be new, and that in this respect, therefore, they present a just claim to a patent; we do not perceive, however, in what respect this is superior to other presses which have been constructed for the same purpose.

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31. For a *Spring Lancet, with a Guard;* Samuel Wilmot, Bridgeport, Fairfield county, Connecticut, October 25.

The principal *novelty*, we apprehend, in this lancet, is supposed to be the guard, which is a piece of metal having a slot in it, and attached to the case; the blade of the lancet is to pass through this slot, in the operation of bleeding. The guard is made adjustable, to regulate the depth to which the lancet is to pass, and is, in using it, to be laid and pressed upon the vein.

The manner of fixing the spring, and the adjustments of the guard, are explained in the description; but in these there is nothing specially noticeable. As respects the guard, it has been long known to us. We saw a lancet with one, in the hands of a gentleman in Philadelphia at least twenty years ago. Some bleeders are in the habit of regulating the depth of the cut by taking out the small spring under the blade of the lancet, leaving it to play up and down loosely; by laying it on the vein in this state, it may be sustained at any height by the skin, and will, when struck, enter to a corresponding depth.

The patentee makes no claim, but if he had done so, the guard, we suppose, would have held the most prominent place; he no doubt supposed that to be new, as it has never gone into general use, and may not now, although it is patented.

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32. For a *Machine for cutting Fur from Pelt;* Dennison Williams, city of New York, October 25.

It is intended, by means of the machine here patented, to cut a portion only of the fur from skins, leaving them still with enough upon them for the manufacture of trimmings, caps, and other articles for which fur is employed. It is stated that whilst a quantity of fur is thus obtained for the manufacture of hats, the pelt will frequently be rendered the more valuable by cutting it down to that part where the fur is finest and thickest.

A considerable number of knives are to be prepared of such length and width as may be required by the nature of the fur to be cut. Their edges are to be straight, and they are to be pointed at one end; by their opposite ends they are to be fixed in a piece of wood, or metal, so that their blades may form an angle of about 45 degrees with the face of the piece in which they are fixed, their edges being even with it, and all lying in the same horizontal plane; they will then stand, in relation to each other, like the slats of a Venitian blind, but they are, in general, to be within one-fourth of an inch of each other. The pointed ends then stand out like the points of a comb, and may be passed through the fur of a skin, laying upon a table. A strip adapted to the purpose is then placed over the points of the knives, by which means the frame by which they are enclosed is rendered complete. A portion of the fur rises above the blades, and this is what is to be cut off. A single knife, called the operating knife, is fixed to a block which is made to slide over the frame; the edge of this knife just clears those before described, and cuts the fur, to do which the more perfectly it is made to pass in an oblique direction. Another modification of the machine is described, which, however, is the same in principle.

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33. For an improvement in *Water Wheels;* Thomas Winslow, Jay, Oxford county, Maine, October 25.

Folding ladle boards are to be attached to this wheel, which are to open, and be acted upon in one direction, but are to close during one-half of the circuit of the wheel. The affair is, in fact, a current wheel, with folding buckets, hinged so as to extend from the periphery to the shaft, and having check chains to regulate the width to which they shall open. We have had to notice numerous contrivances of this kind, but never have made, and never expect to make, our notice approbatory. They are all poor contrivances, the buckets not standing open more than half the time appointed for them; they do but little work, being in a rickety state, and often wanting the doctor, who, if a man of skill, soon pronounces them incurable.

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34. For an improvement in the *Manufacture of Moccasins, Socks, Boots, Shoes, Mittens, Gloves, &c.;* Dennison Williams, city of New York, October 25.

The dressing of skins with the fur on for manufacturing the above articles, is the subject of this patent. The composition used is seal oil, potash, pyroligneous acid, and salt, which are to be mixed together and rubbed upon the skin, heat being employed to aid the friction, and the operation being continued until the skin is saturated, and rendered flexible, and water proof.

Sal ammoniac is sometimes to be added, but this, and the proportion of the other ingredients, is left to the discretion of the operator. The patentee says that this composition is preferable to any other used for the same purpose. Upon the face of the thing it seems to

present some chemical contradictions, but against the evidence of facts, when made clear, we have nothing to urge.

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35. For a *Churn;* Eli Wellman, Salem, Jefferson county, Ohio, October 25.

In this churn there are to be two dashers, the shafts of which are operated upon by two cranks on a shaft within a frame above the body of the churn. By turning a handle, a wheel revolves, and a strap from this passes over a whirl on the crank shaft. This kind of contrivance may be good enough, and we see no reason to object to it; as a patented affair, however, its pretensions are more than questionable, yet the patentee has contrived to make out several claims, some of which, and we believe the whole of them, would have been relinquished had he sought the proper lesson at the patent office. He claims, for example, the iron crank with two bends; the double dashers, and the joints in the pitmen by which they are attached to the shafts of the dashers.

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36. For a *Smut Machine;* Samuel Winslow, Poughkeepsie, Dutchess county, New York, October 25.

This machine resembles, in its general construction and operation, the common mill stones for grinding; but the rubbing surfaces, or scouring plates, may consist of punched sheet iron, or they may be of stone, or of cast iron. A hopper for feeding, a bridge tree for regulating, a curb, spout, &c. are to be fixed much in the usual manner. As the rubbed grain passes to the spout, it is acted upon by a fan wheel which drives the smut, &c. through a trough, away from the grain.

This machine is said to be in some respects an improvement on "Case's smut machine," and we think that it resembles it not a little; to avoid interfering, however, he says that he "claims the right of running it in any place in a mill, except on the curb over the stone, and by any gearing in a mill except by the damsel."

If a patent is to depend upon the place in which a machine is used, or upon the precise part of other machinery from which it derives its motion, its prop is a very weak one, and a patent must not be a weighty concern.

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37. For *Fireplaces for the Burning of Anthracite or other Fuel;* Artemus Turrel, Boston, Massachusetts, October 25.

The grate upon which the fuel is to be burnt is on a level with the hearth, there being an air flue from below, or from without the room, leading to it. A sort of forked poker, which the patentee calls a picker, rises through the bars of the grate, to disturb the fire, and is to be moved by a lever. These are the two things claimed, and they do not, as represented, induce us to break the tenth commandment.

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38. For a mode of *Making Awl Hafts;* David M. Smith, Gilsum, Cheshire county, New Hampshire, October 25.

The common shoe-maker's awl is to be fixed in the haft which the patentee describes, and his claim will probably afford as much information respecting it as most of our readers will desire to obtain; it is as follows:

"What I claim is the mode of constructing an awl-haft so as to move, in and out, a split socket into which the shank of an awl blade is inserted, and by which it is held firmly."

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39. For a *Churn;* Joseph Rickey, Morgan county, Ohio, October 25.

We described a churn, No. 14, with double revolving dashers. This is exactly like it excepting in the mode of giving motion to the dashers, which, in the present instance, is effected by whirls and bands, there being one on each of the shafts, and two upon an upright shaft which is to be turned by a crank. The band which drives one of the dashers is crossed, to give the reverse motions. Both the patentees reside in the state of Ohio, and being subjected to similar meteoraceous influences, may possibly account for the similarity in their mental productions.

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40. For a *Machine for Cutting Endless Screws;* John H. Schrader, city of Philadelphia, October 25.

The screws are to be formed by revolving cutters, operating in a way which cannot well be explained without a drawing. The purpose to which the instrument is applied, is principally, we believe, for cutting the endless screws on the tightening keys of guitars, and other musical instruments of that description.

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41. For *Carriages for Rail-roads;* Isaac Cooper, Baltimore, Maryland, October 25.

This patent appears to be taken for a mode of attaching together two or more cars for rail-roads, so as to give them the necessary play, and attain other advantages. The frame work of the cars is put together much in the ordinary way, with two side pieces, and five cross pieces mortised and tenoned together. The wheels and axles are to run in boxes as usual; the improvement consisting in what the patentee calls safety bars, which are used for connecting two cars together. Suppose two cars brought up within a few inches of each other, two bars are placed below the cross bars of the cars, extending to about the centre of each; they stand parallel to each other, within, and free from the wheels. Through each of them there are two long mortises, or slots, which admit screw bolts, to attach them to one of the cross bars of the cars, the slots allowing the bars to play lengthwise. They pass through staples on another cross bar, which are made so wide as to admit of sufficient lateral play to enable them to adapt themselves to the curvature of the road. There are cushions of leather, or other yielding material on each end of the bars, and a yielding piece, or spring board, for them to strike against, which are

to prevent injury when the first car is stopped, and the second advances upon it.

As a check to the lateral motion of the cars, there are also to be chains crossing each other diagonally between the connected ends of the cars; that is, a chain placed a few inches from the end of one of the side pieces, extends diagonally to the opposite side piece of the other car, and so of the other two side pieces, the two chains crossing and forming an ×.

The claim is to the manner of constructing and applying the safety bars, by means of which the cars may run safely, although one or more wheels be broken; and by means of which a pair of wheels may be dispensed with from each car; also to the transverse chains to prevent too much lateral play; also to the cushions and fender pieces.

We do not anticipate all the advantages from this thing which the patentee appears to contemplate; he says that when the bars are thus attached, both of the pairs of wheels near the attached ends may be taken away, one pair answering as well as two. Now if the cars are loaded, it is plain that the weight upon the safety bars will prevent their working so as to adapt themselves to a curved road. The cars, it is said, may be made with one pair of wheels placed in the centre; but in this case they, and their bearings, must be made proportionably strong; and still there would be no novelty in making cars with two wheels only: those patented by Mr. Saml. T. Jones, (see vol. v. p. 149,) were of this description.

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42. For an improvement in *Water Pumps;* Moses Buclin, Grafton, Grafton county, New Hampshire, October 25.

The improvements described in this patent are quite as good as many others for which patents have been taken, especially those for pumps; respecting the action of which, simple as it is, there is an abundant stock of ignorance, even among the makers themselves. The patentee claims two things as of his invention, one of which is the boring of the pump log, immediately below the chamber, conical; a lining of lead is to be prepared to fit this, and is to terminate in a pipe of lead, leading to the water in the well. This lead lining is to be jammed down so that it may fit itself to the log; at the bottom of it, there is a valve covering the end of the leaden pipe. The object of this contrivance is to make all the parts concerned, water tight. The lead, we are told, will be perfectly wholesome, a fact of which we might otherwise have entertained some doubt.

The next *improvement* is a vacuum, or air vessel; this name to be sure appears a little contradictory, but in this it does not stand alone. The vacuum, or air vessel, is to be fixed near the pump; it is in the form of a barrel, and lined with lead; the pipe from the pump enters it at one end, and at the other, it is entered by that leading from the well; it may be considered, therefore, merely as an enlargement of the pipe itself; we are not illuminated by the patentee as respects its modus operandi, he only telling us that it is of great use when the water is to come from a great distance.

43. For machinery for *Polishing and Cleaning Rice;* Joshua M. Buskey, city of New York, October 25.

A trough four or five feet in length, and about twenty-two inches in diameter, is to be made in the form of a half cylinder, and, this placed horizontally, is to contain the rice to be cleaned. A cover is made in the same form, which, when put on, renders the cylinder complete. An internal cylinder, supported upon gudgeons, is to revolve within the trough. This may consist of two circular heads, with iron bars extending from end to end, or of a solid cylinder, with projecting spikes. The rice, mixed with emery, or with sand, is to be let fall from a hopper into the trough, when the motion of the internal cylinder will quickly clean and polish it. A fine sieve is afterwards employed to separate the emery, or sand, from the rice.

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44. For a *Rack Wrench*, for turning the nuts of screws; Henry King, Springfield, Hampden county, Massachusetts, October 25.

This is intended as a substitute for the screw wrench, to which we think it superior in all respects. The main bar of the wrench is square, and the upper side of it is notched across, to receive a click. The sliding cheek of the wrench is supported by a piece projecting from the back of it which rests upon the bar. This carries a spring and click, and when the wrench is to be used, all that is necessary is to push the sliding piece against the nut, the spring forcing the click into one of the notches on the bar, and thus holding it in its proper place.

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45. For machinery for *Breaking and Cleaning Hemp and Flax;* Arnold Zellner, Giles county, Tennessee, October 25.

The machine for breaking the hemp, consists of two fluted rollers, one placed above the other. The bottom roller is usually about two feet in diameter; the top one a foot, or more. The spaces between the flutes are about one and a half inch, which breaks the stalk into lengths of about three-fourths of an inch. The feeding is effected by placing the hemp upon an inclined plane, and advancing it, by hand, between the rollers. If properly rotted, it is passed but once through, and is then ready for the cleaner.

The revolving cleaner consists of two circular heads placed upon a shaft, with four beaters of hard wood, or metal, passing from one head to the other. The spaces between these beaters have boards inserted, so as to form a quadrangular box. The circular heads project farther than the beaters, and prevent the hemp from getting beyond them, towards the gudgeons. These beaters revolve in a semicylindrical trough, formed of slats, or laths, extending along it, the shives escaping through the spaces between them. The hemp, held in the hand, is passed in about one-half of its length, and when that is beaten clean, the other end is operated upon.

The dust, &c. escapes through a trunk leading to the outside of the building.

The fluted rollers are not claimed, but only the particular manner

of constructing them, as described. The cleaning apparatus is claimed as new in its whole arrangement.

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46. For a *Washing Machine;* Camm Moore, Guilford county, North Carolina, October 30

Eight pages of close writing are devoted to the description of this washing machine, the precise dimensions of every piece being given, together with instructions to the workman who is to make it. We, however, must be content with a very general and brief description. The clothes are to be placed in a longitudinal trough, the bottom of which is formed of slats, and rollers are to be passed over them. These rollers, two or more in number, consist of circular heads, with slats passing from one to the other, and forming the periphery of the rollers. The slats are placed obliquely, and slope in reversed directions on the two rollers. The rollers are preserved in their respective situations, and act together by having their gudgeons, at each end, pass into holes in strips of iron; the lever, therefore, which drives the first acts also on the second. The bottom of the trough may be made of sheet iron, and the water in it be heated by a fire beneath it.

It is contemplated to apply this machine to the washing of wool, the scouring of leather, and other purposes.

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47. For a *Steam Engine;* Seth Boyden, Newark, Essex county, New Jersey, October 31.

We were going to say that the patentee has presented us with another rotary engine, but this would have been incorrect, as he has merely again presented one which others had before offered. The principle and general arrangement are precisely the same with that of several rotary pumps which we have described, some of which it has been proposed to use also as steam engines. Two toothed wheels, gearing exactly into each other, are enclosed within a cylinder, into which steam is admitted from below, and from which it escapes through another tube above the toothed wheels. The teeth of the wheels must work, in part of their circuit, close against concave pieces, which may be said to form their stuffing.

Defective as the rotary steam engine usually is, this is about one of the worst forms which has been given to it, and, like contention, it is best left off before it be meddled with.

Specifications of American Patents.

Specification of a patent for a machine for Hulling Clover and cleaning Wheat. Granted to George Faber, *Chambersburg, and* Edward Faber, *Pittsburgh, Pennsylvania, October* 13, 1832.

To all whom it may concern, be it known, that we, George Faber, of Chambersburg, Franklin county, and Edward Faber, of Pittsburgh,

Allegheny county, in the state of Pennsylvania, have invented an improvement in the machine for hulling clover, and other seeds, and that the following is a full and exact description thereof.

The general principle upon which this machine is constructed is the same as that of some other hulling machines already in use; that is to say, it has a cylinder which is made to revolve within a concave cylindrical segment, between which two parts the seeds are rubbed, and the hulling is effected; but the improvement which we have made consists in covering either the cylinder or the concave with bristles, so as to form the same into a brush; we, however, prefer the converting of the cylinder into a brush, although the end may be obtained in either way. In describing our machine we shall consider the cylinder as being so made.

The concave may be formed of various materials, and we do not intend to confine ourselves to any one, but merely to construct it in such a way as that it shall be sufficiently rough on its surface, or present such asperities, as shall enable the brush by its revolution against it to hull the seed completely.

We intend, in some cases, to make the concave of cast iron, furnished with flutes from end to end, or with fine teeth, or points upon its surface, which will answer the same purpose. Instead of using cast iron, we shall, sometimes, bend sheet iron into the proper form, punching it all over, so as to convert its inner surface into a grater, by the asperities which will be thus raised. We also design to use sand stone made into the proper form, or to mould a mixture of plaster of Paris, or other cement, with sand, emery, pulverized glass, or other hard substance; or to attach such substances to wood, or other articles, by means of glue, paint, or otherwise; not intending, however, to claim either of these as making any part of our invention; the whole, or the greater part of them, having been before employed for the same, or for similar purposes.

The feeding may be effected by means of a hopper, in the usual way, and a fan may be added to separate the chaff from the seed.

What we claim as our invention, and for which we ask a patent, is the covering of the cylinder, or the concave, with stiff hair or bristles, so as to form the same into a brush, between which and a surface made rough by any suitable means, the seed and the hull of clover, or other grass, are separated from each other, in the manner, and upon the principle hereinbefore described.

GEORGE FABER.
EDWARD FABER.

Specification of a patent for an improved mode of manufacturing oval and other Axes. Granted to ASAHEL COLLINS, *Winstead, Litchfield county, Connecticut, October* 25, 1832.

To all whom it may concern, be it known, that I, Asahel Collins, of Winstead, in the county of Litchfield, and state of Connecticut,

have invented an improvement in the mode of manufacturing oval, or felling, and other axes, by the aid of rollers, and that the following is a full and exact description of the same.

Rollers have been heretofore employed for the making of axes, and of many other articles of iron, which are usually forged out on the anvil by the hammer; I do not therefore claim to be the inventor of rollers, or of their application to the object in view, but only to such a construction or form of them as shall obviate the difficulties which have been hitherto experienced in the use of them. As heretofore employed, the rollers have been indented in such a way that when made to revolve, and properly geared, a bar of heated iron passed beetwen them might receive the desired form, so far as it could be effected by them; it, however, has not been found possible to give to their sides, or edges, that precise shape which the axe should have when finished, in consequence of the tendency of the metal to spread laterally, the rollers, as constructed, not confining the iron at the sides or edges, but on the faces only.

In my improved mode of forming the rollers, I make two grooves in one of them, surrounding the roller, and at such a distance apart as shall correspond with the width of the axe, or axes, to be formed; and on the other roller, I make two projecting rims, or fillets, which fit into these grooves. The inner edges of each of these rims, or fillets, are so curved or indented as to correspond with the swells, or indentations to be formed on the edges of the axe; such a shape being likewise given to the inner edges of the grooves, or, (which is the same thing,) to the exterior edges of the projecting part between the grooves, by which one face of the axe is moulded, as shall likewise correspond with the curvatures, or indentations, on the inner edges of the rims, or fillets.

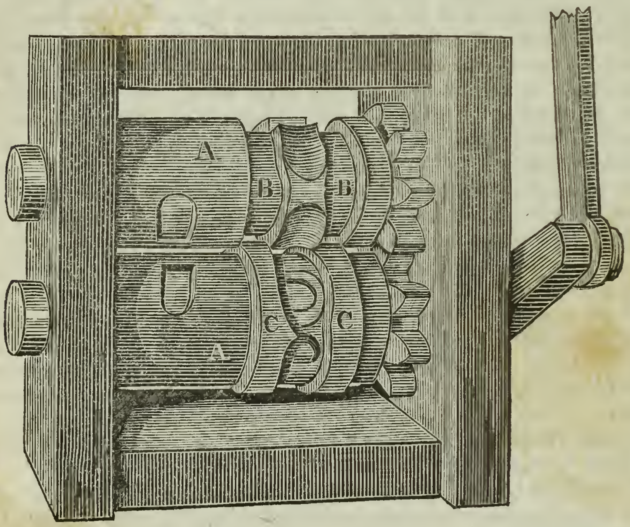
The rollers may be so excavated, or indented, as to form two or more axes, in one revolution, according to the diameter given to them; and they are to be so shaped as to deliver the axes ready for doubling over, with the edges and points so formed as to be ready to receive the steel, so that the final welding may be at once performed. The bar from which the axes are to be rolled may be of any convenient length, and will not require to be divided or cut into lengths, previously to rolling. Rollers, as above constructed, may be varied in their form so as to suit all the different kinds of axes made; and the steel for the axes I likewise prepare by rolling in the same way.

For the purpose of finishing so as to give a more smooth surface and a more precise form to the axes than will be afforded by the rolling and subsequent welding, I prepare dies of steel which may be fastened upon rollers by screws, or otherwise, and between these the axe is rolled by a vibratory motion, carrying it from end to end of the dies. Although I have named rollers, it is manifest that segments of rollers only are requisite for this purpose. A weighted lever, or other power, may be used to press the rollers together. A powerful press, with dies adapted thereto, may be made to answer a similar end. The forms given to such dies, must necessarily be governed by the nature of the work which they have to perform.

What I claim as my invention is the use of the rims, or fillets, and the corresponding grooves by which the metal is confined laterally, and the eye, the oval, and other parts, are made to assume their proper forms in the manner hereinbefore described. I also claim the using of steel dies fixed upon rollers, or segments of rollers, for the purposes set forth.

ASHAEL COLLINS.

Collins' Axe Machine.



A A, rollers. B B, grooves. C C, projecting rims in the other.

Abstract of the specification of a patent for improvements in the Bar-share or Fallow Plough. First patented October 1, 1825, *which patent was surrendered, and cancelled, on account of a defective specification, and reissued to the patentee,* GIDEON DAVIS, *Georgetown, District of Columbia, March,* 6, 1833.

(WITH A COPPERPLATE.)

The greatest possible perfection to be attained in the bar-share or fallow plough is, that it be so shaped and constructed as to detach the furrow slice from the solid ground, raise it up, and turn it over, in the easiest, the neatest, the most uniform, and effectual manner, with the least labour, both to the ploughman and the team; combining at

the same time also, the advantages of being simple in its construction, strong, durable, easy to keep in repair, and cheap.

With a view as far as is practicable to combine all these various objects, I begin by making the mould-board, land-side, and standard, (a birth, or place for the beam to rest on,) all of cast iron, and in a solid piece; this I do in the manner in which Charles Newbold, of New Jersey, made his improved plough, patented in the year 1797, but with the several alterations and improvements hereinafter particularly specified and described.

First Item. Of the shape of the *moulding part*, or what is commonly called the *face* of the *mould-board.*—The general principle heretofore approved by scientific men who have turned their attention to this subject is, that as the furrow slice is detached from the solid ground at a straight line parallel to the surface, that it should be raised up and turned over, so as to retain as far as possible, that same flat shape; and in order to accommodate the shape of the moulding part, or what is commonly called the face of the mould-board, to this idea of raising the furrow slice up, and turning it over, it has been so constructed as to form straight lines lengthwise, either horizontal, or more or less inclined, so as to correspond with another set of straight lines at right angles with the land-side, or nearly so, commencing at the point, touching the edge of the share and lower edge of the mould-board, which as they recede from the point of commencement, gradually change from a horizontal to a perpendicular direction, and even pass beyond the perpendicular far enough to give the proper over-jet behind. And it has been thought that mould-boards so constructed, would fit and embrace every part of the under side of the furrow slice in the operation of raising it up, and turning it over in the most perfect manner possible; not observing, however, that the furrow slice does, and must necessarily, acquire a convex form on the under side, during the operation. But the true state of the case is, that in raising the furrow slice, and turning it over, it always does either acquire a convex form on the underside, or else it is broken off into pieces, and thrown over. But it is found, that mould-boards which are constructed on this principle, wear through about midway, whilst the upper and lower edges are scarcely rubbed at all.

In order to remedy the inconveniences arising from this mode of structure, I form the moulding part, or the face of the mould-board of my plough differently. This I do with a view to make it fit and embrace the convex form which the furrow slice is disposed to assume, and thereby bring it, as near as may be, to an equal bearing on all parts; to do which, instead of working off the moulding part, or the face of the mould-board of my plough to straight lines, correspondent to straight lines at right angles, or nearly so, I work it off to fit circular or spherical lines of different radii, and at various angles. To explain which, (see plate,) fig. 1st is a segment of a circle of thirty-six inches radius. Fig. 2nd is a segment of a circle of twelve inches radius. Fig. 3d is a bottom view of the moulding part of my improved plough; including the land-side and shoe, (or heel piece,) with the mould-board and share. Fig. 4, is a right hand side view of a right

hand plough, with a cast iron share. Fig. 5 is a left hand view of a right hand plough, with a wrought iron share.

To shape the moulding part, or make the face of the mould-board.— Suppose it to be for a ten inch (or a two horse) plough, such as would be of a suitable size for turning a furrow slice of about twelve inches. Having obtained a suitable block, I begin by laying off the bottom, see fig. 3, I consider twenty-four inches a suitable length for the land-side, say from *a* at the point to *b* at the heel of the plough. From *a* at the point I draw a circular line with the large segment, fig. 1, so as to intersect a line at right angles to the plane of the land-side at *b*, and twelve inches distant, with the arc of the circle extended out from the plane of the land-side, see *a a a a*. Then having worked the edge of the block off to this line, I turn the block down, and then work the side from *a* at the point, fig. 4, to *a*, at a perpendicular raised twelve inches from the horizontal line, or bottom, and twenty-four inches back from the point of commencement, and vertical to the circular bottom line at that point, with the arc of the circle extended in towards the plane of the land side. Then, having wrought to the shape of this circular line, I apply the small segment, fig. 2, with the arc of the circle extended in towards the aforesaid two lines, and as nearly at right angles with them as is practicable, and then I work off the face of the block so that this small segment will touch the aforesaid two circular lines at various places, corresponding to the lines *c c c c*, &c. so as to produce, as nearly as may be, an equal bearing on all parts of the face of the block. These lines at *c c c c*, &c. would all terminate at a point at *d*, which is about twenty-four inches below the horizontal line, or bottom, of the mould-board, and vertical to the heel, or end, of the land-side. This produces a shape which, (so far as appears,) has not heretofore been applied to any solid. But of those shapes which are known and used, it approaches nearest to the *loxodromic*, or *spiral curve*, although it is not such exactly. But it is a fact that this shape when applied to practice, is found in the operation of raising a furrow slice up, and turning it over, to fit the convex form which it is disposed to assume much more uniformly than any other heretofore applied to that purpose, as is proved by its equal wear over its whole surface.

But this principle may be modified so as to produce a vast variety of different shapes, merely by enlarging or diminishing the radius of either the horizontal or inclined circular lines lengthwise, or, the circle of the segment, which is applied crosswise. After having thus obtained the shape adapted to my purpose, I mould the face of the block in sand, take casts in lead therefrom, and finish the pattern for the mould-board.

Believing that this mode or rule of attaining the proper shape for the moulding part, or what is commonly called the face of the mould-board of a plough, is an original invention of my own, I therefore claim the whole exclusive privilege of making, using, and vending the same, in all the variety of simple changes that may be made conformable to the rule heretofore described.

Second Item. Of the *shape of the throat* (as it is commonly called,)

and the hind part of the mould-board.—See figs. 4 and 5. At *e* I construct this part of my plough with a gentle curve from the top of the share entirely up to the beam, which, at a suitable height for my plough, correspondent to its size, will incline so much forward at the top, as to project considerably over. This is the termination of the fore and top part of the mould-board, the top of which is made so as to form a birth for the beam to rest upon, and be made fast to, and is properly the standard, or sheath of the plough. I also dress off the edge, or fore part of the throat, round, as it ascends from the top of the share, instead of leaving it sharp; and I increase its breadth as it approaches the beam. This is to prevent brambles, long grass, &c. from lapping so short on the throat as they would do if it was left sharp. The inclination forward at the upper part of the throat, forms a curve with the underside of the beam; the pressure from below then naturally forces any such incumbrance up, which then falls off, and the plough runs clear. This I consider an improvement.

The hind part of the mould-board, see *f*, fig. 4, I dress off in a gentle curve from the hind end of the wing of the share, up to the hind corner of the mould-board. This shape answers every purpose in turning the furrow slice, and as it does not come down to the bottom of the furrow, the plough works easier to the ploughman.

Believing that these shapes for the throat, (or fore part,) and hind part of the mould-board, have not been known or used before, I applied them to use; I therefore claim the whole and exclusive right to them.

Third Item. Of the *structure of the land-side*, and the connexion of it with the mould-board, and of the standard, or fore and top part of the mould-board.—In the construction of the plough, I make the land-side thin and broad, see *g*, figs. 3 and 5, which gives strength vertically, with but little weight. This form makes it a guard also, which prevents sods and dirt from working in and clogging that part of the plough. To give the necessary strength sideways, I make a rib on the land-side about midway between the top and the bottom of it, see *h*, fig. 3. This rib I make broad where it joins the mould-board, at *h*, and tapering as it extends back towards the end of the land-side, where there is a birth for the handle of the plough to be fastened on, at *i*, fig. 3, and *k*, fig. 5, I make a projection, or jog, to rise about half an inch, for the end of the handle to rest against. This rest, jog, sustains the pressure of the handle endways, so that the screw-bolt is only required to confine it sideways.

Charles Newbold, in the construction of his improved plough, made the standard, or fore and top part of the mould-board, to pass up through a mortise in the beam. In my plough I make the standard to extend only up to the beam; the top of it I make broad and flat, so that the beam may rest solid on it, and be fastened to it with a strong screw-bolt, which may be made either to pass up through the top of the standard vertically at *j*, fig. 5; or it may pass down through the beam and the standard in an inclined direction, having on the inside of it a birth for the nut of the screw to work on at *j*, fig. 4; this serves the purpose of adjusting the plough. I use also as a swivel on which

to turn the beam to the right or left, by the operation of which, the plough may be made to take more or less land.

Land-sides have been heretofore constructed which were made broad and thin, but they were supported in a different manner. My improvement, therefore, consists only in my mode of making and applying the rib, which gives ample support to the land-side, in every way, and is at the same time entirely out of the way in ploughing. The peculiar shape in which I make the mould-board of my plough, and the manner of bringing the fore part of it up to the beam, causes it to extend further forward under the beam, than the standard of any other plough, which is an improvemeut, because it equalizes the bearing of it. What I claim as my own invention and improvement in this item, is the mode of connecting the land-side to the mould-board by a rib, as here described, with the jog, or rest, on the land-side to sustain the handle; and the extension of the standard forward so much further under the beam than is usual.

Fourth Item. The shoe or heel piece.—In Charles Newbold's improved plough, a bar of wrought iron extended from the wing of the share, back to the end of the land-side, and lay flat on the under part of it, and was fastened on with a screw-bolt passing up through both. The Messrs. Stevens, of New York, in the construction of their improved plough, patented in 1820 and 21, applied a shoe, or heel piece, on the bottom of the land-side of their plough, which they fastened on by extending an ear, or projection up and on the inside of the land-side, with a small screw-bolt passing through both. Shoes of such construction, however, will only protect the bottom of the land-side, whilst the side, though quite as much exposed, is not protected at all. To obviate this inconvenience, I make a counter sink, or groove, on the outside and lower edge of the land-side of my plough, which forms a birth for the shoe, and admits of thickness enough for the substance of the shoe, without any inconvenience from its projecting out, see *k k*, figs. 3 and 5. I make the shoe to extend round and under the bottom of the land-side, and fasten it on with a small screw-bolt. By which means, the shoe thus constructed protects both the side and bottom of the land-side. The shoes may be cast in metallic moulds, the chill serving to render them hard; or they may be made of wrought iron, or of steel. The improvement which I claim in this item, is that of constructing the shoe so that it will protect both the side and bottom of the land-side; and I also claim the making the cast iron shoe in metallic moulds.

Fifth Item. My mode of *making, applying, and using the share of the plough*, whether made of wrought or cast iron.—If I apply the wrought iron share, I make it partly in the usual way, by welding the wing of the share on the land-side, see fig. 6; but I make the bar to extend back of the wing some two or three inches, as at *m*, and fasten it to the land-side with a small screw-bolt at *n*, fig. 5. I then fasten the wing of the share to the mould-board with a strong screw-bolt, having the head of it made to fit a tapering hole in the mould-board, and passing down through the wing of the share at *p*, fig. 6, and drawn tight by a nut. If it be a right hand plough, this should

be a left hand screw; and if a left hand plough, then it should be a right hand screw.

The point and edge of the share may be made in the common shape, but those shapes represented at figs. 3, 4, and 6, I think much more useful, whether made of wrought or cast iron. If a plough works well, the point of the share is disposed to wear off round. Hence, I make the point of the share round; I also make it about twice the common width, and much thinner. Shares of this construction, whether made of wrought or cast iron, wear more uniformly than others, and being so much thinner, they wear longer, and work better, at the same expense.

If I apply a cast iron share, I make a counter sink on the lower and front part of the mould-board, as at *q*, fig. 4, and at *s*, fig. 3, on which I fit the share somewhat in the manner in which Richard B. Chenoweth, of Baltimore, fitted the share on his improved plough, patented in the year 1808, but with some alterations and improvements. Although the point and edge of the share could, in his plough, be extended forward, still the desired effect was not produced. The point and edge will naturally wear to a bevil on the under side, and it was owing to this circumstance that the share would not penetrate the ground, and not because it wanted more length. In order to adapt the point and edge of the share to my principle of adjustment, that is, so that it may be set deeper and more bevilling as the under part of it wears off, I fasten the share on my plough with a single screw-bolt, although two or more may be used, and when first put on, I lay between the lower edge of the mould-board and the under side of the share, a small piece, or strip, of some soft wood, as at *s*, fig. 3. This strip may be about one-fourth of an inch thick at, or near, the point of the mould-board, and taper off to an edge at the other end, and about half or three-quarters of an inch in width: it, however, should be made of such thickness as to set the point and edge of the share level with the after part of the plough. The effect of this, in use, is that, as this strip of wood is somewhat elastic, it has a tendency to diminish the sharpness of the stroke, which otherwise would be produced if the castings were to come together. But the great advantage is, that it affords an opportunity of adjusting the point and edge of the share, so that when it has worn to a bevil on the under side, the piece, or strip, of wood may be taken out and a thinner one put in, or it may be removed entirely. The cast iron share, thus constructed, will wear a great deal longer, and do more and better work than cast iron shares heretofore in use. In making the cast iron shares, I also sometimes use a different process, that is, instead of moulding the pattern of the share wholly in sand, I make one part of the mould of metal; the effect of which is that the shares are sufficiently chilled to render them hard, the metallic part of the mould being applied to the upper surface of the share, the wearing part of it is rendered clean, hard and smooth, which lessens the friction. This mode also saves nearly one-half the labour in moulding, and of course the shares are cheaper. Now what I claim as my invention or improvement in this item, is my mode of making, and manner of applying and using

the share of the plough as here described, whether made of wrought or cast iron.

Sixth Item. My mode of *stocking* and manner of *using* the plough.—Formerly it was the practice to make the beam immoveably fast to the standard and the land-side handle, whatever may have been the mode of fastening adopted; but Charles Newbold, in the stocking of his plough, constructed it so that the fore end of the beam could be raised or lowered by the use of the key, or wedge, at the standard, but it could not be moved sideways, and the hind end of the beam was made fast in a mortice in the land-side handle. This, I believe, was the first attempt at adjusting the set of a plough by altering the stock. Though he did not describe this circumstance in his specification, he informed me that such was the fact. But since that time there have been various modes adopted of raising and lowering the beam of the plough at the standard, by screws, keys, wedges, &c.

In the stocking of my plough, I begin by making the land-side handle fast to the inside of the land-side, as at *k*, fig. 5. I then fit the beam on a block of wood, of about one inch in thickness, laid on the top of the standard, as at *u*, figs. 4 and 5, and then I make the hind end of it to lay fair against the inside, or outside, of the handle, as at *w* figs. 4 and 5. I then make the beam fast on the standard, with a strong screw-bolt, either passing up through the front part of the standard and the beam, as at *j*, fig. 5, or by passing a screw-bolt inclined down through the beam and the standard, as at *j*, fig. 4. Either of these modes will permit the beam to move on the top of the standard in the manner of a swivel, so that I can move the fore end of it to the right or left at pleasure. The hind end of the beam I then make fast, by a screw-bolt, to the inside or outside of the land-side handle, as at *w*, figs. 4 and 5. Thus affording the ploughman an opportunity of *adjusting the plough.* If the plough is disposed to work too shallow, it may be set deeper by merely putting a piece of leather, or wood, between the top of the standard and the beam, or, rather, the block under the beam. If the plough should work too deep, it is adjusted by taking some off the block. By the use of this mode of adjusting the plough, it may very soon be altered to work after either horses, mules, or oxen.

I fasten the other handle to the mould-board with two small screw-bolts, as at figs. 4 and 5. The two handles I connect together with two rounds, see *w w*, figs. 4 and 5. Thus framed, if it is desired to set the plough more to land, I loosen the upper screw-bolt, by which the handle is fastened to the mould-board, and drive a wedge between the handle and the mould-board, as at *z*, fig. 5. If the plough should take too much land, then I loosen the lower bolt, and drive a wedge between the lower end of the handle and the mould-board. If I wish to set a two horse plough to work after three horses abreast, then I loosen the beam from the handle, and put in a block of about two inches thick, as at *w x*, fig. 5; the thickness of the block must be adjusted by practice. The end of the screw-bolt, which confines the end of the beam, the block, and the handle together, must then have

a brace applied, which I make fast upon the handle, fifteen or eighteen inches above. If required, the plough may be made to work after the team walking on the sward, or turf, by the side of the open furrow, and still to run well; the only alteration required being to put in a thicker block between the handle and the end of the beam. This has been done in marshy land, where the animals could not walk in the open furrow. The only use of the block which I put under the beam of my plough, and on the top of the standard, is that it raises the beam that much higher from the ground, and affords an opportunity of continuing the curve of the throat of the plough, in a more complete form than could otherwise be given.

What I claim as my improvement in this item, is my mode of applying the beam to the standard; and my manner of raising and lowering it on the standard; and my mode of fastening the end of the beam on the side of the handle, together with that of adjusting the fore end of the beam, by turning it to the right or left, and of making the hind end of it fast to the handle higher or lower; the application of the block between the beam and the standard, and the beam and the handle.

Seventh Item. Of the Coulter.—If I apply the locked coulter, I put it on a nib on the point of the share, which of course must be made of wrought iron. The only difference in my mode of applying the locked coulter to the plough, from what has been common, is that instead of making a mortise in the beam for the upper end of the coulter to pass through, I make the mortise on the land-side of the beam, by putting on a block of wood with a place cut out in it, which forms a mortise by the side of the beam; this block I fasten on with screw-bolts, and, of course, I can give the coulter any inclination back that may be required, and fasten it with wedges in the usual way.

The advantages of applying and using the locked coulter in this way is, that it sets the top of it to lean a little over to the land, which causes it to detach the furrow slice more easily than it would do if it was set vertical, or inclined a little over to the furrow; but having satisfied myself, by actual experiment, that it requires an increase of twenty-two per cent., or more, of power in the draught with a locked than with a sward coulter properly fitted to it, my attention has been principally directed to the latter; but this I apply in a different manner from any heretofore in use. Instead of putting the coulter through a mortise in the beam, I apply it to the side of the beam, see *y*, figs. 4 and 5. To fasten the coulter, I have holes made through its shank; I then put a strong screw-bolt through the beam and the coulter at whatever hole is best suited to my purpose. I then put a strong iron strap on the outside of the coulter, having a hole in it for the screw-bolt to pass through, all of which I draw hard up with a nut; then, having the lower end of this strap made square, or round, and somewhat tapering to the end, I bend it back behind the coulter, and round in front of the standard. Thus fitted on, if the coulter rests solidly against the side of the standard, and fair against the beam, the effect is, that the point of the share, when at work, runs

from two to three, and sometimes five or six, inches in advance of the edge of the coulter, by which means it has the sward so much raised, and strained, that the edge of the coulter slits it open in the easiest manner possible.

That which I claim in this item as my improvement, is the mode of applying the coulters to the side of the beam, instead of through a mortise in it; and, more especially, the particular manner of fastening the sward coulter to the plough, and using it, so as not to cut the sward until the point of the share has raised it up so as to have it on a strain.

GIDEON DAVIS.

¶ LIST OF FRENCH PATENTS.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the third quarter of the year 1831.*

[TRANSLATED FOR THIS JOURNAL.]

[Continued from p. 192.]

Peter Lieutaud, and J. J. Hyp. Bicard, August 29th, (15 years.) A flour mill, with a conical mill-stone. (P. Invent.)

A. Lombardon, ex-magistrate, Marseilles, August 6th, (5 years.) A pump which gives a constant stream. (P. Invent.)

Ch. Ang. Lupé and Lewis Joseph Salmon, Paris, August 29th, grantees of Peter Augustus Lupé, of a ten years' patent for an invention; viz. for a method of restoring to animal black, which has been used to discolour sugar, the discolouring properties lost in that process. (P. Improv.)

Andrew Marouy, Paris, September 10th, (5 years.) A new three wheeled harrow, in which the axle of the fore wheel turns freely in a horizontal plane, in any required direction. (P. Invent. Improv.)

Matthew de Dombasle, Roville, Department of the Meurthe, August 1st, (15 years.) An apparatus for what he calls decocting process, to be used in extracting sugar from the beet. (P. Improv.)

Berry Miller, of London, represented at Paris by Perpigna, August 6th, (5 years.) An improved pedometer. (P. Import. Improv.)

James Milligan, England, represented at Paris by Truffaut, August 1st, (15 years.) An apparatus to regulate the temperature in the processes of evaporation, distillation, &c. (P. Invent. Import. and Improv.)

Ant. Morateur, wheelwright, and Francis Thibaudon, turner, Ly-

* P. Invent. denotes patents for inventions. P. Invent. and Improv. patents for invention and improvement. P. Improv. Patents for improvement. P. Import. Patents for importation, or the introduction of foreign inventions and improvements.

ons, August 22nd, (5 years.) A process for conveying, by a constant oblique, or vertical, ascent, a stream of water four inches in diameter, to the tops of the highest buildings, and even of mountains, when the elevation is not very great, by the aid of pumps worked by the wind. (P. Invent.)

Phil. Mousset, mechanician, Lyons, August 22nd, (5 years.) A machine to wind silks. (P. Improv.)

William Newton, Engineer, London, represented at Paris by Perpigna, August 6th, (10 years.) An improvement in the touch-holes, &c. of percussion guns. (P. Import. Improv.)

Onesiphorus Pecqueur, mechanician and engineer, Paris, August 29th. A new arrangement of a steam engine, and a new system of boilers, adapted to the manufacture of sugar from the beet, and to the refining of sugars in general. (P. Improv.)

P. T. Fl. Pepin, Paris, August 6th, (15 years.) A machine for shelling grain, berries, seeds, &c. and for making shelled and pearl barley. (P. Invent. Improv.)

Ant. Remi Polonceau, inspector of roads, September 10th, (15 years.) A system of bridges. (P. Improv.)

J. Ser. Poullot, Paris, August 16th, (15 years.) Processes for manufacturing compound combustibles. (P. Invent.)

Raingo, brothers, watch-makers, Paris, August 22nd, (10 years.) An addition to the patent granted to M. Sorel, whose grantees they are. A new system of steam engine. (P. Improv.)

A. J. H. Rendevhagen, Paris, July 13th, (10 years.) Military and common trunks, wagons, military tents, portmanteaus, &c. (P. Invent.)

J. A. Robert, medical student, Paris, September 10th, (15 years.) A kind of fire arms, loaded at the stock, and cocked by the motion of raising the piece. (P. Improv.)

P. M. B. Robin, sea captain, Rochefort, represented at Paris by Mathieu, August 29th, (15 years.) A mechanical lock, with concentric cylinders. (P. Improv.)

P. J. Rouen, Paris, August 16th, (10 years.) A hydraulic balance regulating the course and action of liquids and fluids. (P. Invent.)

Urbin Sartoris, Paris, September 10th, (15 years.) An improvement applied to the flood gate boat, patented by him on the 25th of March, 1826. (P. Invent. Improv.)

L. V. A. Sire and C. A. J. Girardot, represented by Mr. Aneglier, at Vesoul, Department of the Haute, Saone, August 22nd, (10 years.) For a single cylinder roller, for the manufacture of biscaian guns, balls, and other articles hitherto moulded. (P. Invent.)

Aut. Dom Sisco, mechanician, Paris, August 6th, (5 years.) An instrument which he calls a setting spring box, containing all the tools necessary to put up fire arms, or to take them to pieces. (P. Improv.)

C. H. Story, Paris, August 19th, (10 years.) A window impermeable to wind and water. (P. Invent. Import.)

Taillepied, Paris, August 29th, (5 years.) Processes for obtaining and using a concentrated and moveable power. (P. Invent.)

Phil. Taylor, civil engineer, at Beau Grenelle, Department of the Seine. A grantee of the patent taken out by M. Mackintosh, August 16th, (10 years.) A method of improving the process of combustion, by imparting a more powerful draught. (P. Invent.)

Phil. Taylor, civil engineer, at Beau Grenelle, Department of the Seine, August 29th, (10 years.) A new gasometer. (P. Import.

Touron & Co., represented at Paris by Coreil, August 1st, (5 years.) Processes for printing hair stuffs, with permanent colours. (P. Invent. Improv.)

V. P. Triquet, piano manufacturer, Paris, July 18th, (10 years.) An improvement in the construction of pianos. (P. Invent. Improv.)

Andrew Et. Trompette, Paris, September 10th, (10 years.) A new method of hanging gig boxes. (P. Improv.)

Fr. Baris Vouillemont, at Joinville, represented at Paris by M. Armonville, August 6th, (10 years.) A new and simple plough, in which the stock and share are cast in one piece. (P. Invent.)

John Zuber & Co., manufacturers of coloured paper, Reixheim, Department of the Upper Rhine, August 29th, (15 years.) A machine for manufacturing the continuous sheet paper, and an apparatus for drying, dressing, and preparing the same. (P. Improv.)

Recapitulation.—During the third quarter of 1831 were granted, in France, seventy-seven patents.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

*On the art of Glass Blowing. By Lafonde.**

[Translated for this Journal.†]

The progress of the art of glass blowing is naturally connected with the improvement in physical and chemical science; this is especially true in relation to chemical science, the remarkable epochs in which have produced corresponding changes in this art, which is an important auxiliary to that of the chemist.

Previous to the important era marked by the labours of Lavoisier and his successors, the art of glass blowing, as connected with natural science, scarcely existed, and in the older works we find the various operations now commonly practised scarcely noticed.

The operations of the art were then limited to four,—to sealing, bending, and soldering, and to blowing a bulb. The perfection to which this art has now been brought, in its application to the construction of chemical implements, entitles it to be numbered among the mechanical branches which should be acquired by every practical chemist.

* Journal des Connaiss Usuelles, No. 91.

† By request of the Committee on Publications.

Even chemists who reside in cities are not always able to obtain readily, the instruments which they may need, and have repeatedly acknowledged the advantage to be derived from an acquaintance with this art.

The reason of this is easily explained; the very moment at which the idea of a new piece of apparatus, or of a modification of an instrument, presents itself to the mind of the chemist, is the very time at which he should realize his conception. If he is obliged to leave his laboratory, with his experiment half finished, to apply to a workman, who can rarely be induced to quit his ordinary routine of work, precious time must be lost in procuring what a little practice would have enabled him to make in a very few minutes.

The difficulty would be still greater if a new instrument was to be made. Every one who has had his ideas carried into effect by ordinary workmen, knows the vexation and disappointment attending the execution, and that it is much better to devote a portion of the time, which would otherwise be disagreeably spent, in enabling himself to construct the required apparatus.

If it is agreeable and even useful to those who are, so to speak, at the fountain head, to possess this art, it is *essential* to those who do not enjoy such an advantage. The convenience of being able, with a set of tubes, and an instrument essentially portable and handy, to construct any piece of apparatus which may be wanted, is too obvious to need illustration. It might happen that the article required is too fragile to be conveyed from the place where it might be procured, and thus the art becomes indispensable.

This art enables the lecturer on natural philosophy to furnish his cabinet, at a trifling expense, with many instruments, which, if made of metal, would be costly. The transparency of the glass articles is decidedly an advantage, enabling pupils to perceive at a glance the play of a machine which, if made of metal, would require a long explanation from the lecturer.

Most of the apparatus used in electrical experiments, as electrometers, &c. are, when of glass, decidedly superior to those of metal, as they are insulated without any special arrangement for the purpose.

It would be tedious to enumerate the many instruments with which the art of glass blowing may furnish the analyst. Apothecaries, not residing in large towns, if possessed of this art, will not be without Welther's tubes, which are frequently so difficult to obtain.

Finally, the proprietor of a manufactory, who must have a laboratory for the analysis of the materials which he procures from the market, and of the products with which he furnishes it, and who is generally at a distance from large cities, will especially feel the necessity of mastering an art which will enable him to provide himself with the instruments which he may require, without the assistance of the skill of others.

The fragility of glass instruments is an objection which may be urged against them, but the facility with which the broken articles may be replaced, and the trifling cost of the materials, is more than

sufficient to remove that objection, and the art of glass blowing may be reckoned among the most useful of arts to those engaged in chemical pursuits.

Success in the construction of glass apparatus requires two kinds of knowledge, the one relating to the choice of materials, which will be treated under the head of "the choice of Glass." The other relating to the mode of making the apparatus, which may be thus divided:

1st. Of the elements of which different articles and apparatus are formed.

2ndly. The construction, properly so called, or the manner of putting together the several pieces composing a piece of apparatus, with reference to the order of the succession in the different operations.

On the Choice of Glass.

As glass tubes are, with few exceptions, the only articles of glass which are used, our special attention should be directed towards this form of the material. In the choice reference should be had to two things, to the dimensions and quality.

The length, size of the bore, and thickness of the tube, must, of course, be determined by the dimensions of the apparatus to be made; but it is essential that the thickness of the tube shall be the same in the parts which are to be worked.

An example which will show the necessity for this, is afforded by one of the commonest operations, that of blowing a bulb. Suppose the tube which is to be used is unequally thick; if, after heating it moderately, we try to blow a bulb upon it, the thinnest parts being most thoroughly heated, and therefore most softened, will yield easily to the pressure of the breath, while the thicker ones being less heated, and consequently distending with more difficulty, will not only produce irregularities in the form of the bulb, but by the inequalities in thickness at different points, will render the instrument liable to break by sudden variations of temperature.

If the glass be heated for a long time, so as to bring the thickest parts towards the point of fusion, they will, on account of their greater mass, distend more than the thinner parts, and thus produce a result entirely similar to that explained in the last paragraph.

After a proper diameter has been selected for a tube, we should take care that this diameter be uniform throughout the length of the tube, that the surface be entirely free from knots, or small globular projections, and more especially that the thickness be perfectly uniform.

The selection of tubes with reference to the quality of the material, is a more difficult task. Habit enables the eye to distinguish between the very good, the medium quality, and the bad glass. There are, however, a few characters which have seldom deceived us, and which we give, therefore, as guides.

Some tubes, when viewed by reflection, present a dull bluish opaline tint, mixed with the usual light green colour. This glass seems to contain lime, it softens with difficulty, and hence requires long

exposure to the flame, in which it acquires a dark hue that disfigures the apparatus made with it. The thickness of such tubes is always great in proportion to their diameter.

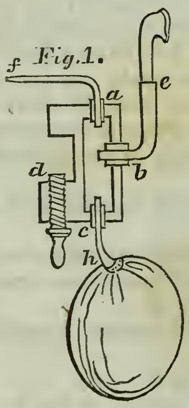
The other tubes are usually thin, and are white, with a slight shade of pink. Their fusibility renders them difficult to work, by those who are not very well skilled in the glass blower's art, and their use will defeat the attempt to make most of the apparatus which requires that they should be soldered to tubes of a different quality.

A defect to be found in certain tubes, and which we will merely indicate, not being able to furnish any sure test for recognising it, is that of losing their polish when heated. To avoid this description of tubes, which, however, are not common, we would recommend that all the operations required in the construction of a piece of apparatus should be gone through before soldering the parts together.

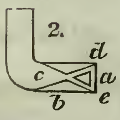
To sum up, in relating to the selection of tubes,—a good tube should have a light green colour, it should be easily divisible by the cut of a file, and present a smooth section of a fine green colour.

The Lamp.

We come now to the different modes of heating the glass to the required temperature. In instruments for this purpose a lamp, more or less like the enameller's lamp, is used, the mode of producing a blast being different in each. The eolipile throws a jet of the vapour of alcohol from a metallic globe heated over a small lamp; and the enameller's table furnishes a blast of air by a double bellows, placed under the table, and moved by the foot of the operator.

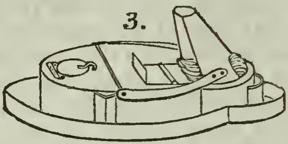


The apparatus which we consider best, and which we shall, therefore, carefully describe, is that invented by M. Danger. It consists of a wooden vice, *a b c d*, fig. 1, which by the aid of a screw, *d*, can be fastened wherever it may be convenient. Through the axis of the vice passes a cylindrical cavity *a c*, to the upper orifice, *a*, to which a metal or glass tube is to be fixed to give the required blast; to the lower aperture, *c*, is to be fastened one of the ends of the tube *c h*, to which a large bladder is connected at *h*. At *b* is seen the end of another duct at right angles to the first; to this duct is fitted a curved tube *b e*, through which air from the lungs is introduced into the bladder. The tube *b e* is contracted at *b*, as shown by fig. 2.. To this contraction, forming a conical cavity, with its base at *a*, is adapted a conical valve of cork, *a c*, which is confined by a peg, *d e*, to prevent it from rising too far.



The bladder being squeezed between the knees, the air introduced into it presses on the base of the cork valve, forcing it against the sides of the tube, which is thus stopped. The cork should be greased with a little tallow, to make the valve tight. The tube being thus closed, the air passes to *a*, fig. 1, escaping by the jet pipe.

3.



The lamp, fig. 3, is not unlike the enameller's lamp; the principal improvement consists in a cap in the shape of a truncated cone, which can be placed over the blazing part of the wick, contributing to the ignition of the smoke, and preserving the flame from the influence of currents of air, which would otherwise make it unsteady. This cap has near its base two openings; the smaller aperture serves to admit the air; the larger allows the flame to escape.

No better wicks can be had than those which the operator may make by winding unbleached knitting cotton to a suitable length. The two wicks used should weigh together an ounce and a half, and care must be taken to keep them always separate.

The glass blower takes his seat at the table, where his instrument is fixed; places the jet pipe in the direction of the two apertures of the cap of the lighted lamp; and blowing through the tube *b e*, fig. 1, fills the bladder with air; he then presses the bladder between his knees, producing a blast which is directed through the flame.

Two kinds of jets are used, according to circumstances; the one is slender and pointed, and resembles that produced by the mouth blowpipe; it affords, like that jet, an oxidizing and deoxidizing flame. A slight pressure of the knees only is required to supply this jet. The other jet is of a variable size, but always larger than the first, and requires a stronger pressure. In the first, the jet pipe passes between the wicks of the lamp; in the second the extremity of the jet touches the first orifice of the cap.

The blast-pipe, bladder, and tube, for filling the bladder with air, are fixed in their respective openings by corks.

Having explained the manner of putting together the apparatus for glass blowing, we proceed to treat of the several operations, premising a few rules which should be strictly adhered to.

1. Never to heat a piece of glass beyond the temperature requisite for the result to be obtained.

2. Never to work a piece of glass when damp.

3. Never to transfer a piece suddenly from cold air to the flame, or, vice versa, but to remove it from the flame gradually, in order to anneal it.

4. To keep the piece constantly in the flame, until its withdrawal is required by the operation to be performed upon it.

5. To complete as far as possible, all the pieces composing an apparatus, before soldering any two together.

6. To turn the pieces round continually in the flame, when their form allows it, and always in the same direction.

7. Never to inflate the bladder from the lungs, but with the air which the cheeks when inflated can contain, and which furnishes always an adequate supply.

First Operation.

Rounding the Edge of a Tube.

1. This operation, to which, from its simplicity and frequent occurrence, we assign the first place, consists in smoothing and polishing the sharp edges of a tube that has been cut by a file, by raising the edges to the melting point.

For this operation the small jet is used. Holding the tube in the left hand, between the thumb and the forefinger, with the little finger bent under the tube to steady it, place it over the flame, at the point of greatest heat, which is two-thirds the length of the flame from the cap, a little beyond the tip of the blue. Turn it then, sliding it between the fingers, the thumb bearing it upwards, and the forefinger downwards; holding it so that only a small portion of the circumference may be heated. The reason for this precaution is easily seen, since were all the points of the section at once submitted to the action of the heat necessary for rounding the edges, the edges of the tube would tend to approach each other, and the orifice would contract so much as to become obstructed. When, after a few turns, the edges have become smooth, the operation is terminated.

All tubes that are to be corked, ought to be edged. We shall point out, in what follows, those cases in which edging is required in the construction of instruments.

Widening a Tube.


4.

2. The tube being edged, heat the edges by a small jet of about a line in diameter, then by means of an iron rod, fig. 4, about six inches long, and half an inch in diameter, fixed in a handle, and terminated by a cone, begin the widening; turning the tool with the right hand, in an opposite direction to the rotation of the tube, gradually introducing the cone as the tube gives way. The tool should be held so that its axis and that of the tube may coincide.

[to be continued.]

Stopcock for Glass Plates.

A new kind of stopcock has been submitted to the Society for the Encouragement of National Industry; it is made of two perforated

glass plates, sliding one over the other, and is applicable to any machine containing either liquids or gases.

As in all similar contrivances, when the perforations, of which there is one on each plate, coincide, the confined substance escapes, and when they do not, the communication is cut off.

[*Bulletin de la Soc. d'Encouragement, &c.*

Ivory preserved from becoming yellow.

To preserve the whiteness of ivory, it is essential that it be exposed neither to air, dust,* nor smoke; but neither metal nor wooden cases afford sufficient protection. The author has known delicately wrought ivory instruments enclosed in covered boxes, to become yellow in a short time, and the same has occurred in wooden and metallic cases. Glass alone possesses the requisite properties for preserving it.

Bell glasses, ground at bottom, or when the object to be protected is of considerable size, square cages of glass answer every purpose.

Even metal cases with glass doors are insufficient for the purpose. Few can be obtained impervious to dust, and even when such are found, they are ineffectual for preserving the ivory free from *colour*, for its whiteness is retained only on the side exposed to the glass. Of this, the author's own experience has convinced him. In the Royal Cabinet at Copenhagen, there is in a case of the kind mentioned, a large ivory vase, ornamented with sculptured figures, the work of the Danish artist Jean Hollaender. This exquisite piece of workmanship had been placed against the glass, and apparently had not been disturbed for a number of years. On turning it round, the side which had not been exposed to the light was found of a brown colour.

[*French translation of a Danish memoir. Recueil Indust.*

¶ *Selections from Lectures on Pottery, delivered before the Royal Institution, London, by* A. Aikins, F. L. S. F. G. S.

(Continued from p. 204.)

Vitreous glazes, whether employed simply for closing the pores of baked clay, and thus rendering it impermeable to water, or with the farther intention of concealing the coarseness and bad colour of the body by a covering of enamel, appear to have originated in China; for the earliest European travellers in that country make mention of temples covered and encrusted by varnished tiles of various colours.

The articles of delft ware, for which there still continues to be an effective demand, are plain white tiles for dairies and for lining baths, pomatum pots, and a few jugs, and other similar articles, of a pale blue colour.

* Dust is very injurious; it becomes fixed in the pores, diminishes the brightness, and roughens the surface of the ivory. Its removal is besides difficult, on account of its fineness.

The material employed is calcareous clay, or marl, of a blue, red, or yellow colour, from the neighbourhood of Maidstone, and therefore probably belongs to the deposit called the Weald clay, which lies below the green sand. The first process which it undergoes is that of grinding with water, and passing it in this state over fine sieves, in order to separate the coarser particles. The excess of water is then dried off, by exposing the fine mud to spontaneous evaporation in shallow tanks or pits. While still in a soft state, it is beat up by hand, and then heaped up in a cave or clay cellar (as it is technically called) till wanted. The longer it remains here, the more tenacious and plastic it becomes. It is then tempered for use by passing it through a pug-mill, or is kneaded by treading; the addition of sand of every kind being carefully avoided. The ware is formed in the usual way, then dried, and afterwards placed in the arch of the kiln to burn into biscuit. It is now of a pale buff colour, the lime in the clay having combined with the oxide of iron, and thus preventing it from exhibiting the red colour which is natural to it, and which it possesses when combined with sand or with mere clay. The glaze is thus formed: Kelp and Woolwich sand are calcined together under the kiln till they combine into a spongy, imperfect glass or frit; lead and tin are calcined together till they form a grayish white powdery oxide, called by the potters tin and lead ashes; the frit is then ground dry, and afterwards mixed with the ashes, a little zaffre being added if a blue tint is required, and arsenic if the glaze is intended to be white. The composition being well mixed dry, is put in the hottest part of the kiln, where it runs into a vitreous opaque enamel. This latter is then ground under a heavy runner of iron, and is finally mixed with water, and rubbed between stones to the consistence of cream. The biscuit, rendered bibulous by drying, is then dipped in this cream, and a sufficient quantity of glaze adheres to the surface of it. The ware is next dried, packed into saggars, which are boxes of clay, to prevent it from being injured by the smoke; and these saggars are piled in the kiln. A heat, moderate for the first twelve hours, and stronger for the last twelve hours, is applied, which vitrifies the glaze on the surface of the ware, and thus completes the process.

As the use of the delft pottery was superseded by the earthenware of Staffordshire, it might seem more natural for me to pass to the description of this latter, rather than to the subject of porcelain. But the European imitations of the Chinese porcelain have introduced so many modifications in the manufacture of the finer kinds of earthenware, that the line of distinction between them has become almost evanescent; and I think it will conduce to the clearer understanding of that part of my subject which yet remains to be illustrated, if I begin with the porcelain of China.

The introduction of the Chinese porcelain soon excited a strong desire in the various countries of Europe to imitate it; but as the establishment of experimental manufactories for this purpose required the expenditure of considerable sums, and at a risk beyond the means of private persons, it is chiefly to the munificence of the sovereigns of

Europe that the public are indebted for the first steps made in this interesting art. In Germany chemists and mineralogists were set to work; the latter to seek for the most appropriate raw materials, and the former to purify and to combine them in the most advantageous proportions. The French government adopted the very sensible plan of instructing some of the Jesuit missionaries, who at that time had penetrated to the court of China, and into most of the provinces of that empire, to collect on the spot specimens of the materials employed by the Chinese themselves, together with the particulars of the process. The precise result thus obtained is not known; for as a considerable rivalry existed between the different royal manufactories of this ware, the most valuable information would of course be kept as secret as possible. The most detailed account hitherto given to the public, is that collected by the Père de Entrecolles, and printed in the *Arts et Métiers* of the Royal Academy of Paris, of which I shall give an abstract.

There are three materials employed in forming the body of Chinese porcelain, but all the three are never used at once.

The first is called *petuntse:* it contains scattered shining particles, is fine-grained, and is quarried from certain rocks. It is prepared for use by first breaking it with hammers, then grinding it in mortars with iron pestles, and lastly, is washed over, taking only the white creamy matter that floats on the surface, which, after being dried and pressed into small cakes, is fit for use.

The second material is called *kaolin*, and appears to be porcelain clay, namely, that which results from the decomposition of felspar. It is described as occurring in lumps in the clefts of mountains, covered with a reddish earth. It is prepared for use exactly in the same manner as the *petuntse.*

The third material is called *hoaché;* it is used instead of *kaolin*. It has a smooth, soapy feel, and no doubt is either steatite, or soapstone, or agalmatolite. It is prepared for use exactly in the same manner as the preceding. Porcelain made with this latter is much dearer than that made with *kaolin*. It has an exceedingly fine grain, and is very light; but, at the same time, is more fragile, and it is not easy to hit on the precise degree of heat that suits it. For the finest porcelain, four parts of *hoaché* are added to one of *petuntse*. Sometimes the body of the ware is made with *kaolin;* and then the article, when dry, is dipped in the *hoaché*, brought to the consistence of cream: what adheres forms a thin layer, on which, when dry, are laid the colours and the glaze; and thus a porcelain finer than the common is obtained. *Hoaché* is also laid with a pencil, before glazing, on those parts of the common porcelain that are intended to have an ivory white colour.

For the fine *kaolin* porcelains, equal parts of that substance and of *petuntse* are employed; for the less fine, two parts of the former and three of the latter. The ingredients being put together in due proportions, the mass is carefully tempered and kneaded by hand, and then the ware is wrought on the wheel, or, for articles of irregular figure which cannot be thus formed, is made by pressing the compo-

sition into moulds, and then uniting the several pieces by moist clay. The piece being formed is very carefully dried, and is then covered with the glaze. The white semitransparent glaze is thus prepared: The whitest *petuntse* with green spots is pulverized and washed over, as already described; and to one hundred parts of the cream thus obtained, are added one part of *che-kao* (burnt alum,) previously pulverized. A caustic potash ley is also prepared, into which *che-kao* is stirred, and the cream thus produced is collected. The two creams are then mixed together in the proportions of ten measures of the former to one of the latter. This composition it is which gives to porcelain its whiteness and lustre.

A brown glaze is made of common yellow clay, washed over, and brought to the consistence of cream, and then mixed with the former glaze. If the brown glaze is not to cover the whole of the surface, wet paper is laid on the reserved parts, which, after the glaze has been put on and has ceased to be fluid, is removed, and such blank parts are then painted in colours, and covered with the common white glaze.

When the glaze is thoroughly dry, the ware is put into the furnace for the first time; whence it appears that the ware is never in the state of biscuit; a circumstance in which the process materially differs from that adopted by, I believe, all the European manufacturers, who never put on the glaze till after the first firing of the ware.

The flux used with those colours that are laid on over the glaze is made of quartz, calcined and pulverized, and then mixed with ceruse, in the proportion of one of quartz to two of ceruse.

Red is given by peroxide of iron, produced by calcining green vitriol; and a finer red is made of copper, but the particular process is kept secret.

The enamel colours are tempered to the proper consistence by a solution of glue, except those into the composition of which the ceruse enters; these latter are tempered only with water.

Such, in few words, is nearly all that is publicly known of the manufacture of porcelain in China, except the mode of packing the ware in saggars previous to firing, and certain other mechanical details not likely to be of general interest.

On the preceding description I shall hazard a few remarks, being at the same time sensible how likely one not practically acquainted with the manufacture is to fall into error.

In the first place, I think it may be doubted whether the petuntse of the Chinese is a granular quartz or siliceous sandstone, as it is commonly supposed to be. I do not lay much stress on the green spots said to characterize the most valued varieties of this substance, though this colour is of very rare occurrence in sandstones, but by no means uncommon in the porphyritic varieties of compact felspar, so abundant in many parts of North Wales, and of Cumberland and Westmoreland. In the next place, sandstone, however finely pounded, will not form a cream on the surface of water into which it has been stirred, but will subside almost immediately; whereas, if compact felspar is treated in the same way, the finest of the particles will

be brought almost to the state of clay, and will form a cream when stirred with water. That my statement respecting comminuted felspar passing in no great length of time to the state of moderately plastic clay is correct, I may appeal to the experience of every one who has observed how soon the granite fragments which are laid on the streets in London, get bound together by a meagre but tenacious clay, formed by the grinding of these stones (of which felspar forms the chief ingredient) by the continued action of carriage wheels. Thirdly, porcelain clay is of itself scarcely at all fusible, and the addition of 100 or 200 per cent. of fine sand to it would make a perfectly opaque body, incapable of undergoing that state of semifusion by which alone the true porcelainous texture can be produced. Neither could this substance be formed into a glaze by mixture with burnt alum and precipitated alumina, although the addition of these latter ingredients to the powder of compact felspar would form a composition capable of vitrifying at a high heat into a translucent or semi-opaque enamel. I am therefore inclined to believe that the petuntse is compact felspar and not sandstone; and that those manufacturers who use calcined flints, or other substances, containing silica almost in a state of purity, as the representative of petuntse, are obliged to add, besides porcelain clay, the other avowed ingredient, some alkaline or vitreous flux, in order to give the ware its due degree of semi-transparency. Such addition, however, cannot be made without incurring the hazard of lowering too far the infusibility of the porcelain.

All the Chinese porcelains that I have had an opportunity of examining may be reduced to three kinds, as far as regards the body of the ware. The first is that of which the larger pieces of the old blue and white Nankin are formed. Its texture is in general compact, with more or less tendency to fine granular; the fracture surface is even, with a glistening, somewhat resinous lustre; it is translucent at the edges, and has a very pale ochre yellow colour. In order to conceal the colour, it is covered with a white semiopaque glaze of considerable thickness.

The second differs from the former in having a more compact texture and a white colour. Its glaze is therefore thin and transparent, or nearly so. When the inner surface is left white, as in coffee-cups and other articles of domestic use, no glaze seems to have been applied on that side, it being of itself sufficiently smooth and glossy.

The third kind is lighter than the preceding; it is translucent, has a beautifully even shining surface, but the glaze is so thin as to be scarcely perceptible: it is made only into small articles, and seems to answer well to the hoaché porcelain of D'Entrecolles. All the above varieties are exceedingly infusible, being decidedly superior in this quality to most of the European kinds.

[TO BE CONTINUED.]

Diving Operations at Portsmouth.

To the Editor of the Nautical Magazine.

Portsmouth, 18th August, 1832.

Sir,—You request me to give you a few lines on the subject of the ingenious and enterprising Mr. Deane's submarine operations, and I therefore copy for you a memorandum which I made after seeing that gentleman make an excursion under water, on Friday, the 10th of this month, to the great edification and amusement of the good folks of this busy place.

The essential part of Mr. Deane's machinery consists of a large metal helmet-like covering for his head and neck, which rests upon his shoulders, and is attached by straps to his body.

At the top there enters the end of a long flexible tube, connected with an air pump, through which, by means of a winch, the requisite supply can be forced in, while the air which has been used, finds its way out by a short pipe at the lower part of the helmet. Three windows of strong glass protected by stout cross wires, enable the diver to see the objects round him. Over his legs, arms and body, he draws a water-tight dress of Mackintosh's cloth; but this is merely to prevent the inconvenience of getting wet, and has nothing to do with the diving bell machinery, which consists in the helmet and air-pipe alone. Instead of being lowered down, as in the case of the diving bell, Mr. Deane employs a ladder, one end of which rests on the ground, the other against the side of his vessel, anchored over the object he wishes to examine. It is necessary, however, in order to his easy descent, that he should attach weights to his body, and I think he told me the quantity required was not less than sixty or seventy pounds, besides thick leaden soles to his shoes.

When all is ready, he very deliberately steps on the ladder, and walks off under the surface! The effect on the spectators is extremely curious, as the bold experimenter is gradually lost sight of, and the only indication of his place is a series of bubbles rising over him. On reaching the bottom, he quits the ladder, and roves at pleasure along the ground, sometimes proceeding to a considerable distance from his vessel, the only limit, indeed, appearing to be the length of the air pipe, of which there lies a considerable coil on the deck. I forgot to mention that a small rope is tied round his middle, the end of which is held on board by his son, a fine lad of about twelve years of age, the only person whom his father ever permits to touch this important part of the apparatus. By pulling it once or twice, or jerking it in a particular manner, the diver has acquired the means of communicating his wishes to the people above. Sometimes he wishes them to work the air pump harder; sometimes he requires the ladder to be shifted; sometimes to have a basket sent down; sometimes to have a rope lowered, with a hook fastened to it, that the basket which he has filled with things collected at the bottom may be pulled up:

in short, he appears to possess a power of communicating from the bottom of the sea all he wishes, to those above water.

As yet, Mr. Deane's operations in this quarter have been confined to the wreck of H. M. S. Boyne, which you may remember caught fire at Spithead about thirty-seven years ago, and was stranded near South Sea Castle. The most interesting things he has brought up are some bottles of wine, of which the corks are entire, though slightly softened. The external part of the bottles is covered in some places with very fine shells; but all the protuberent parts of the glass have received a slight rubbing, as if they had been pressed against a turning lathe. On the occasion when I saw Mr. Deane go down, he remained seventeen minutes, and brought up a broken bottle, sundry fragments of bolts, a portion of a sword blade, a boat hook, and the bone of a man's leg, probably one of those infatuated wretches, who, at the very instant the fire had reached the door of the magazine, and it was known the ship must soon blow up, busied themselves in stripping off the copper sheathing!

Mr. Deane next proceeds, I understand, to the wreck of the Royal George, where his researches cannot fail to be very interesting. And here I cannot help observing, that it surely is a national disgrace to us that we have permitted that ship to lie at the bottom for so long a period, to the destruction of the very finest part of the noble anchorage of Spithead. Surely government ought long ago to have ordered her to be removed, either whole or in pieces. Not to speak of the Rennies and Telfords of the civil engineers' society, there is not a dock yard in the country that might not have provided men who, in a few weeks or months, would have removed every particle of this devoted ship, and cleared the roadstead of this very serious obstruction.

I am your obedient servant,

B. H.

[*Nautical Magazine.*

Observations on a new Metallic Sheathing for Ships' Bottoms, by Mr. Abraham Booth, Practical Chemist, Lecturer on Chemistry, &c.

Of all the various topics of useful and practical inquiry, which come within the range of scientific investigation, there are, perhaps, few more intimately connected with the commercial spirit of enterprise of this country, than those which relate to naval architecture. The attention of the government, and the private exertions of individual enterprise, have very laudably been directed towards this subject during the last few years, and the eagerness with which the public bestow their patronage and attention upon any attempts at improvement, whilst it may be considered an earnest of the importance of the subject, is also a proof that it amply deserves the attention, and requires the judgment of a discriminating scientific press.

Amongst other individual branches of inquiry, the sheathing for ships' bottoms has occupied no inconsiderable share of attention. To devise some means whereby the timber might be preserved from injury, from general or accidental circumstances, but more particularly from those of marine worms, and other productions, was the first object of attention in the infancy of naval architecture, and this was first effected by the hides of animals, covered with pitch, or asphaltum; but the successive developments introduced by the progress of naval and commercial intercourse, soon brought into requisition the use of metallic sheathing, as being the most durable, and the most eligible and practicable in effect.

Although the use of leaden sheathing was first adopted in the English marine, copper has more latterly been exclusively applied for this purpose. The expense, however, attendant upon the use of this metal, in consequence of its rapid degree of corrosion and decay, when in contact with salt water, has always been found a most serious objection to its use; and to remedy which, various suggestions and numerous experiments have been made, but without success. The corrosion of the metal is found materially to vary in different anchorages, dependant upon local circumstances, or upon the quantity of decaying organic matters contained in the water, and which greatly facilitates the oxidation and solution. At Sheerness the rapidity of decay is very great, in consequence of the copper being subjected to the alternate action of the sea, which flows in there from the Bristol channel, and to the flux of water down the Thames and Medway, loaded, as they undoubtedly are, with the products of animal and vegetable decomposition. A very general belief formerly prevailed, that sea water had very little or no action on pure copper, and that the rapid decay of that metal on certain ships was owing to its impurity; but the converse has been proved to be the fact, as the attempts to purify the metal, which have proved successful since the government have manufactured its own copper sheathing, has unquestionably been the cause of its more rapid decay. Alloys of copper have generally been proved the most durable; and various patents have at different times been taken out for the fabrication of such compounds; but metallic sheets so formed, have uniformly been found too hard and brittle for practical use, and not to admit of that flexibility which is so necessary for their application to a curved surface, and the consequence of which has been, that they have uniformly cracked upon a ship's bottom.

The remedy that presented itself to Sir Humphrey Davy, was, that the corrosion of the copper sheathing might be prevented by rendering the copper electro-positive, by means of the contact of tin, zinc, lead, iron, or some other easily oxidable metal. This was what the superiority of the use of impure copper, or copper alloys would seem to indicate.

Sir Humphrey Davy undoubtedly deserves credit for the zeal and talent with which he prosecuted his investigations; and, although the truth of his remedy was only established by the failure of his experimental trials, yet it pointed out the correctness and value of that

train of investigation, by which alone we can hope to obviate a defect so very serious in naval economy.

I have prefaced these observations as an introduction to a new metallic sheathing, proposed for ships' bottoms, and for other purposes for which iron, tin, and lead are applied; and where these easily oxidable metals are exposed to the action of water or the atmosphere, as in verandas, or on roofs; because it points out the advantages and applications to which our knowledge of the electric states of metals, and metallic combinations, may be extended, and in many cases with peculiar advantage and interest.

My own experiments upon this combination, enable me satisfactorily to recommend it to your notice, as likewise to those of your readers who are engaged in objects of naval intercourse, as it is evidently not acted upon by any of those agents, or in any of those circumstances to which it is exposed from its employment or application. It is the invention of the manufacturer, Baron Wettersdett, a gentleman who can claim the honour of being fellow pupil and associate in chemical studies, with his illustrious countryman Berzelius; and it may, therefore, with justice, be presumed that it is the result of some degree of scientific industry and investigation. It is likewise some satisfaction to observe, that this celebrated philosopher has expressed a favourable opinion respecting the merits of this invention in a letter to the manufacturer.

The marine sheathing I have verified on analysis to be an alloy of lead, antimony, and quicksilver, and the combination of these metals is such as not only to preserve them from oxidating, but also to impart to the composition peculiar qualities of cohesion, tenacity, and elasticity, not possessed by copper, or its alloys in general, and which render it highly eligible for the purpose to which it is applied. The cohesion of the particles is not destroyed by a violent strain or blow, as in copper, but being highly elastic and tenacious, the metal adapts itself to the force of the percussion. Its tenacity gives it a ready adaptation to curved surfaces; which is of very considerable value, not only in first covering the vessel, but has also proved to be very effectual in obviating the effects of any accidental strain which the vessel may receive during her passage, and which under ordinary circumstances might prove instrumental to the loss of the ship and cargo, and would, I doubt not, be found equally so in case of its being driven on the surfaces of rocks or sands. Although the outward surface of the sheathing remains perfectly clean and bright, like silver, there is, under no circumstances, any adhesion of barnacles, or marine productions, which were found so great a source of obstruction in the experimental trials with the Protector, notwithstanding the *a priori* conclusions of Sir Humphrey Davy, that a negative state of electricity would be unfavourable to vegetable life or production. It may likewise be observed, that the combination acquires additional hardness by being in continual contact with sea water; that the price for sheathing a vessel is considerably less than that of copper, and that this is far more durable.

In this, as in similar cases, practical men are best gratified with

practical proofs, and as no train of investigation or philosophical reasoning can be considered perfect unless supported by such testimony, this being now a matter of extensive practice and experience, I have appended the following testimonials, copies of which I received on a late visit to the manufactory, and which, I have no doubt, will satisfy the readers of the Mechanics' Magazine of the merits of this new invention.

Plymouth, August 2, 1832.

"The barque, Royal William, Capt. Thomas Peake, having been lain on the ground in Stonehouse Pool, we, the undersigned, have this day attended alongside and under the bottom of the said ship, for the purpose of examining the state of the patent marine metal sheathing which was put on the Royal William at this port in March last, since which the ship has performed a voyage to Prince Edward Island, and back; and we declare, after a minute inspection, we find no more the appearance of corrosion than would have appeared on the best copper sheathing for the same time. It is quite bright, free from grass, barnacles, or shells; and, although a few sheets were gone, down the bows, it is our belief that this arose from want of sufficient nails, as the ship struck the ice on her passage out. We have no doubt whatever, that the patent marine metal will answer well for sheathing ships.

(Signed.)
W. CUMMING, Surveyor of Shipping, and Sub-Commissioner of Pilotage.
T. PEAKE, Capt. Royal William.
G. PEAKE, Owner of the Ship.
C. CUMMING, Ship-owner.

Portsmouth, August 8, 1832.

The Reward, of this port, having grounded on the coast of Cornwall, near Penzance, and during which time a very heavy surf was running on the shore, that filled the boat alongside, and shook the schooner to a great degree, I declare it to be my belief, that the patent marine metal, from its elasticity, and the tarred paper between it and the vessel's bottom, was the cause of my saving the said schooner, and getting her to the port of Plymouth. The keel of the keelson and some timbers being broken, and the vessel so much strained that she appeared to be kept afloat wholly by the patent sheathing and paper.

(Signed,)
NICHOLAS GOSS, Commander of the Reward.

Newcastle, June 23, 1832.

I am happy to say the Relief has arrived at Sunderland in the best

possible condition. A portion of the new sheathing has been taken off her, and appears quite unaffected by exposure, whilst the copper, placed to secure the edges of the marine metal, was completely corroded and destroyed. The vessel sails again to-morrow for Archangel. I understand that a sheet has been taken off her to send for exhibition to the Baron, which, I doubt not, will be attended with particulars. The piece sent to me is not more affected than that which you showed me at Limehouse. The owner of the Relief intends having another vessel of his sheathed in a similar way; and I shall be glad to learn that the application of this new sheathing for ships' bottoms increases with experience, and that the inventors may be amply remunerated.

(Signed.) T. Crawhalle.

[*Mech. Mag.*

¶ *Account of the arrival of the "Comet" Fire Engine, at Berlin, and of the experiments there made with it.*

From the Allgemeine Preusische Staats-Zeitung, for December 2, 1832.

To the many useful applications of steam power which have been witnessed of late years, we have now to add that of working fire engines by steam. The merit of having first manufactured such an engine is due to Messrs. Braithwaite & Co. of London. This machine, which consists of a six horse power steam engine, and the pumps worked thereby, rests upon a carriage, which can be easily drawn by two horses, and, in consequence of the peculiar construction of the steam boiler, can be brought into action in the course of thirteen minutes. Its effects are extraordinary; and its utility has been already exemplified at several large fires in London, among which may be mentioned the Argyll rooms in Regent street—English opera house, Strand—and, lastly, the celebrated brewery, of Messrs. Barclay, Perkins & Co. On the last occasion the engine particularly distinguished itself; and after the fire, and the total loss of the steam engine and pumping apparatus, it was of extraordinary service to the proprietors of the brewery, in pumping, for twenty-five days, the beer brewed in the part of the building that was saved, to the vats, fifty feet above the level of the street.

As the double acting pump of the engine, which is worked by a six horse steam engine, is six and a half inches diameter, and makes thirty 14 inches double strokes per minute, it can pump in a day of ten hours, 8,640 cubic feet, and in twenty-five days, 216,000 cubic feet, English measure, to the height of fifty feet.

The Prussian Ministry of the Interior, for trade, traffic, and building, has had a similar engine, but of still greater power, made by Messrs. Braithwaite & Co. It works by an engine of fifteen horse power, and is the first of its size made at their manufactory. The

makers have named it the Comet. There were several trials made of it to-day, on the building ground of the court-marshall office, in University street, which proved equally satisfactory with those made for two whole days at London. The engine consists of two horizontal ten-inch double-acting pumps, which are worked by two small steam engines of the united power of fifteen horses. The pumps, engines, and boiler, with connectors, rest on four of Jones' (of London) patent wheels, (cast iron boxes, with wrought iron spokes and rims,) and can, notwithstanding the immense weight of four tons, (when the boiler is charged,) be easily drawn by four horses on a paved road. Those patent wheels are on the same principle as those with which the Artillery Company at Woolwich have made, according to the United Service Journal, such satisfactory experiments. In the course of twenty minutes from lighting the fire in the boiler, the engine was started, and made then twenty to twenty-five strokes per minute. The pumps being ten inches diameter, they will draw, with twenty-five 14 inch strokes, fifty-seven cubic feet per minute, or 3,103 cubic feet per hour, and throw it through the hose to great heights and distances. To the air-chamber there may be fixed four sets of hose, which can be used together or separately. By using one hose, and a jet of one and a fourth inches in diameter, the water was thrown vertically to the surprising height of 120 feet; and at an angle of forty-five to fifty degrees, to a distance of 164 feet. The effects of this engine are accordingly very great, and can even be increased by giving it a quicker stroke. The engine is destined, in particular, for the protection of the Royal Palace, the Cathedral, Museum, new Sufferance warehouses, and court house, the Governor's Palace, his Majesty's Palace, that of her Grace the princess of Lignitz, the Life-Guard House, the Finance Ministry Office, the Academy of Music, the University, the palaces of the Queen of the Netherlands and of his Royal Highness Prince William, the Library, the office of the Minister of the Interior for Trade, &c., the Opera House, and the Royal Buildings in Burg street.

For the supply of the great quantity of water necessary for the engine, cast iron suction pipes are to be laid under the pavement, with plugs to which the suction of the engine may be fixed. In consequence of this arrangement the engine may be used as well for extinguishing fire itself as for supplying other engines with water. As there are 400 feet of hose belonging to it, the water may even by that means be conveyed to great distances; and a large plain may be protected by placing the engine in a circle, the radius of which is 400 feet.

Finally, it is scarcely necessary to observe how advantageous the application of steam is for working fire engines, whether they be on barges or carriages; in the first case without exception—in the latter where there is no want of water. The time of thirteen or twenty minutes, which the generating of steam requires, with small or larger engines, is no drawback to their utility, as the steam is generated whilst the horses are being put in, and the engine driven to the fire, and while the suction is being connected to the water pipes by engines

on carriages. The engine requires an engineer, a stoker, and from one to four men to attend to the hose. It saves the strength of from forty-two to 105 men, according to its size, from six to fifteen horse power; it does not tire, works regularly, and requires no relief. The diminution of a crowd, which is so disagreeable at a fire, and of the space necessary for many small engines—the greater distance from the fire in which this engine may be placed, and the simplification of directing firemens' exertions, are certainly undeniable advantages. If, therefore, even the application of steam fire engines by land may be with us but small, as sufficient water can only be produced near rivers or canals (there being no water-works,) the utility of these engines must call for their general adoption in barges, where there is no such impediment. [*Ibid.*

Advantages of Rail-Roads.

The following statement from the Mechanics' Magazine, of the advantages the public are likely to derive from rail-roads, is clearly displayed in the increasing prosperity of the Liverpool and Manchester rail-way. Before its establishment there were twenty-two regular, and about seven occasional extra coaches, between those places, which, in full, could only carry 688 persons per day. The rail-way from its commencement carried 700,000 persons in eighteen months, being an average of 1070 per day. There has occurred but one fatal accident on it in eighteen months. The fare by coach was 10s. inside and 5s. outside—by rail-way it is 5s. inside, and 3s. 6d. outside. The time occupied in making the journey by coach was four hours—by rail-way it is one and three-fourths hour. All the coaches but one have ceased running, and that chiefly for conveyance of parcels. The mails all travel by the rail-way, at a saving to government of two-thirds of the expense. The rail-way coaches are more commodious than others. The travelling is cheaper, safer, and easier. A great deal of traffic which used to go by other roads, comes now by rail-way; both time and money are saved, though the length of the journey may be often increased. The proportion of passengers carried by rail-way over those carried by coach, has been as twenty-two to ten, in winter, and seventeen or eighteen to ten, in summer. A regiment of soldiers has been carried by the rail-way from Manchester to Liverpool in two hours. Gentlemen's carriages are conveyed on trucks by the rail-way. The locomotives travel in safety after dark. The rate of carriage of goods is 10s. per ton; by canal it used to be 15s. per ton. The time occupied in the journey, by rail-way is two hours; by canal it is twenty hours. The canals have reduced their rates thirty per cent. Goods are delivered in Manchester the same day they are received in Liverpool. By canal they are never delivered before the third day. By rail-way, goods, such as wines and spirits, are not subject to the pilferage which existed on the canals. The

saving to the manufacturers in the neighbourhood of Manchester, in the carriage of cotton alone, has been £20,000 per annum. Some houses of business save £500 a year in carriage. Persons now go from Manchester to Liverpool and back in the same day with great ease. Formerly they were generally obliged to be absent the greater part of two days. More persons now travel on their own business. The rail-way is assessed to the parochial rates in all the parishes through which it passes; though only thirty-one miles, it pays between £3000 and £4000 per annum in parochial rates. Coal pits have been sunk, and manufactories established on the line, giving great employment to the poor; manufactories are also erected on the line, giving increased employment, and thus reducing the number of claimants for parochial relief. The rail-way pays one-fifth of the poor rates in the parishes through which it passes; fresh coal mines sunk, owing to facilities of carriage, and price reduced. It is found advantageous for the carriage of milk and garden produce; arrangements are about to be made for milk to be carried fifteen miles at one shilling for ten gallons, (i. e. less than one farthing per quart.) A great deal of land on the line has been let for garden ground, at increased rents.

Residents on the line find the rail-way a great convenience, by enabling them to attend to their business in Manchester and Liverpool with ease, at little expense. No inconvenience is felt by residents from smoke or noise; and, on the contrary, great advantage is experienced by means of travelling, to and fro, distances of ten miles in half an hour, for one shilling, and without any fatigue. The engines only burn coke. The value of the land on the line has been considerably enhanced by the operation of the rail-way; land cannot be purchased but at a large increase in price. It is much sought after for building, &c. The Rail-way Company, in their late purchases, have been obliged to pay, frequently, double the price they originally paid for their land. A great deal of land has been sold for building at three times its former value. Much waste land on the line has been taken into cultivation, and yields a good rent. Land owners originally opposed to the rail-way are now its warm advocates, having found their fears groundless; they have now been solicitous that the line should pass through their land.

Mr. Babbage observes, in his book on the Economy of Manufactures, "One point of view in which rapid modes of conveyance increases the power of a country, deserves attention. On the Manchester rail-road for example, above half a million of persons travel annually; and supposing each person to save only one hour in the time of transit between Manchester and Liverpool, a saving of five hundred thousand hours, or of fifty thousand working days, of ten hours each, is effected. Now this is equivalent to an addition to the actual power of the country of one hundred and sixty-seven men, without increasing the quantity of food consumed; and it should also be remarked that the time of the class of men thus supplied is far more valuable than that of mere labourers."

[*Rep. Pat. Inv.*

Brown's Gas Vacuum Engine.

Mr. Brown, the inventor of the gas vacuum engine, has recently exhibited on his premises, at Old Brompton, three of his gas engines, of different construction and power, with the latest improvements, in full operation. The principle, or rather the application of the principle, by which this new power is generated, namely, the creation of a vacuum by the ignition of gas in a cylinder, was discovered by Mr. Brown about seven or eight years ago, and he has been since indefatigably employed in bringing his invention to perfection. An engine, on this principle, has been at work for the last eighteen months on the Croydon canal, raising water from the lower to the upper lever, and has, it appears, fully answered its design. This engine which, of course, resembles in many of its details, a steam engine, is, however, simple in its construction. It consists of a wrought iron cylinder, standing in the lower level of the canal. To set it at work, water is turned by a cock upon a wheel, (regulating the motion and number of strokes per minute,) which opens a valve, and admits a certain quantity of gas, from a pipe connected with a gasometer, into the cylinder, which gas is immediately inflamed by a jet of lighted gas, and expels the air from the cylinder by raising the lid, which instantly closes again. A perforated tube, inside the cylinder, fed with water from a pipe outside, gives out the water, cools the cylinder, completes the vacuum, and raises the water in the cylinder to a given height. An atmospheric valve is then opened and the water rushes out of the discharged valve; this is the result of one stroke. The Croydon engine is twenty-two feet high, and two feet six inches diameter. An engine, upon the same construction, at Eagle Lodge, is four feet eight inches diameter, and its power is surprising. The number of strokes it gives per minute is between five and six; and each stroke raises, with tremendous impetus, seven hundred and fifty gallons of water, filling a cistern of the capacity of five and twenty pipes of wine, in about three-quarters of a minute! The expense, or rather the profit, of working these engines, is an important property of the invention. By the accurate calculation of an eminent engineer, it appears that the quantity of small coal consumed last year for the Croydon engine, was 417 chaldrons, which produced 592 chaldrons of coke, and 4800 gallons of tar. The cost of the coal was 458*l.* 14*s.*, to which must be added, for attendance on the engine, repairs, an allowance of per cent. on the value of the building, and ground rent, 208*l.*—making in all 666*l.* 14*s.* The value of the coke and tar was 769*l.* 12*s.* Thus it appears that this engine constitutes a mechanical power, in effective and constant action, retaining a clear profit of 102*l.* 18*s.* per annum, exclusive of what the work may be worth which that power effects. An experiment recently made gave fourteen bushels of common coal, twenty-one bushels of coke, of two qualities, besides the tar, and 1200 feet of gas.

The superiority of these engines over those moved by steam, con-

sists in the simplicity of their construction, the economy of working, the absence of danger, (for there is nothing in them which can occasion explosion,) and the advantage of their being always ready for action. These recommendations particularly adapt them for raising water, drainage, mill machinery, &c. There is one object which they will accomplish to which the steam is not applicable: in large buildings, or public works, they may be applied to fire engines of any power, which may be put into instantaneous action by gas supplied from the mains in the streets, and any quantity of water may thus be thrown to any height at a moment's notice. [*Ibid.*

Improvement in the quality of Iron and Steel, from their becoming rusty when buried in the earth.

The following "extract from Chronicles of Old London Bridge," is sufficiently curious in itself to merit insertion in the Philosophical Magazine and Journal of Science, and as an instance of observation ingeniously applied.

An eminent London cutler, Mr. Weiss, of the Strand, to whose inventions modern surgery is under considerable obligations, has remarked, that steel seemed to be much improved when it had become rusty in the earth, and provided the rust was not facitiously produced by the application of acids.* He accordingly buried some razor blades for nearly three years, and the result fully corresponded to his expectations; the blades were coated with rust, which had the appearance of having exuded from within, but were not eroded, and the quality of the steel was decidedly improved: Analogy led to the conclusion, that the same might hold good with respect to iron under similar circumstances; so with perfect confidence in the justness of his views, he purchased, as soon as an opportunity offered, all the iron, amounting to fifteen tons, with which the piles of London Bridge had been shod. Each shoe consisted of a small inverted pyramid, with four straps rising from the four sides of its base, which embraced and were nailed to the pile; the total length from the point which entered the ground to the end of the strap being about sixteen inches, and the weight about eight pounds.

The pyramidal extremities of the shoes were found to be not much corroded, nor indeed were the straps; but the latter had become extremely and beautifully sonorous, closely resembling in tone the bars and sounding pieces of an Oriental instrument which was exhibited some time since with the Burmese state carriage. When manufac-

* This enterprising artist has informed me, that "some years since, he sent with Capt. Parry, in his voyage to the North Pole, some steel, which was constantly exposed on deck in the northern latitudes without being in the slightest degree rusted, but on arriving in a warmer and moister atmosphere, it became so. This steel he found very good, but not equal to that from London Bridge."

tured, the solid points in question were convertible only into very inferior steel: the same held good with respect to such bolts and other parts of the iron work as were subjected to the experiment, except the straps; these, which in addition to their sonorousness, possessed a degree of toughness quite unapproached by common iron, and which were, in fact, imperfect carburets, produced steel of a quality infinitely superior to any which in the course of his business Mr. Weiss had ever before met with; insomuch that while it was in general request among the workmen for tools, they demanded higher wages for working it. These straps, weighing altogether about eight tons, were consequently separated from the solid points, and these last sold as old iron.* The exterior difference between the parts of the same shoe led at first to the supposition that they were composed of two sorts of iron; but, besides the utter improbability of this, the contrary was proved by an examination, which led to the inference that the extremities of the piles having been charred, the straps of iron closely wedged between them, and the stratum in which they were imbedded must have been subjected to a galvanic action, which in the course of some six or seven hundred years gradually produced the effects recorded in the present paper.

T. J. H.

[*Philosophical Magazine.*

¶ *Hancock's Steam Coach at Brighton.*

To the Editor of the Mechanics' Magazine.

Sir,—Having received an intimation that Mr. Walter Hancock's steam carriage, the "Infant," was on the road to this place on an experimental trip, I went to meet it at eight miles on the London road yesterday morning, and come with it from thence into Brighton. We travelled at the rate of between five and six miles per hour up the steep hill at Pie-Comb, and descended at the rapid rate of full thirteen miles per hour, proceeding afterwards steadily into the town, at ten miles per hour. Mr. Hancock made a detour round the North Steyne enclosure, up to the palace gate, and returned to the Tank near the new church, where he stopped half an hour to take in coke and water, and proceeded immediately on his return to London.

This unexpected visit excited very great interest along the road and in the town, and caused an instantaneous assemblage of the entire neighbourhood, who greeted Mr. Hancock with three hearty cheers. I understand from some of the gentlemen who accompanied

* A successful application of genius or observation is rarely heard of without some one endeavouring to reap the benefit, or the credit, of the discovery, while entitled to neither, nor perhaps understanding the principle on which it depends. The fame of Mr. Weiss' steel soon spread, when another person immediately purchased the bolts and fastenings of the old bridge: the articles manufactured from them will answer equally well as *relics.*

Mr. Hancock from London, that the only inconvenience experienced on the road arose from want of proper relays of coke and water, and that they travelled at the rate of from nine to eleven miles per hour on the more level parts of the road, and from five to seven up the hills. The coke for the first part of the journey was procured in London, and for the latter part from Brighton. A fact worth notice was elicited from this circumstance; namely, that it was much more difficult to keep up the fire with the Brighton coke, and that a much greater quantity of it was consumed than of the London coke, in proceeding equal distances—a circumstance I have found on inquiry to be satisfactorily accounted for by the use of *clay* retorts at our gas works, which enable the proprietors to extract 12,000 feet of gas from a chaldron of coals, while the iron retorts used in London limit the operation to 10,000 feet. Thus the London coke is obviously less exhausted of its carbon than that which is sold at the Brighton gas works.

This experiment is considered here as a very satisfactory proof of the practicability of travelling by steam on common roads. There are several long and steep acclivities between London and Brighton, particularly Red-hill, Hand-cross-hill, and Pie-comb-hill; all of which were gallantly ascended, and the roads were generally wet and heavy.

Mr. Hancock's visit has become a subject of general conversation, and a hope is universally expressed, of soon seeing him again in our town, with his new steam-carriage, the "Æra."

Yours, &c.

C. A. Busby.

Stanhope-place, Brunswick-terrace, Brighton, Nov. 3, 1832.

¶ *Accident from Hancock's Steam Carriage.*

On Saturday last, the 22nd inst., an inquest was held by the Coroner of Essex, at the Harrow inn, Stratford, on the body of Richard Outridge, an engineer in the employment of Mr. W. Hancock, of Stratford, who met his death on Thursday under the following circumstances:—George Bish, foreman to Mr. Hancock, deposed, that the deceased, who had been some months in the employ of Mr. Hancock, was, with other workmen, putting the machinery of a new steam coach in action on the premises in order to try its performances. The witness described the peculiar construction of Mr. Hancock's chamber boilers, and deposed that there were two safety valves on the boilers in question, one of which he had himself weighted to the pressure of one hundred pounds upon the square inch, the deceased undertaking to adjust the one on the other side of the boiler to the same pressure. The witness then left the carriage for a short time, and on his return discovered that the steam was blowing off very powerfully from the valve which he (the witness) had adjusted, and that the sides of the boiler were rapidly distending. Witness called

to the deceased (who was standing in the engine room of the coach, with his back to the boiler, examining the working of the engines,) to throw off the blower, by which means the fire would have nearly ceased its action, but that the deceased replied he had forgotten to fix the lever on; the deceased then stopped the engines; the witness cast his eyes to the valve which had been left to the care of the deceased, when he saw it fastened down by a strong copper wire; he called to the deceased to relieve it, but before he could effect this, (through the wire being twisted several times round an iron punch which the deceased had strongly driven into the wood framing of the engine room, in the absence of witness,) one of the eleven chambers composing the boiler was rent, and the great force of the accumulated steam threw the deceased back against the engines. The deceased was removed into the house, and medical assistance immediately obtained, but he expired in about an hour. The witness, in answer to questions from the jury, said that had it been a boiler as constructed by others, years ago, much injury must have ensued from the fragments of metal which would have been driven in every direction, with great violence, amongst the men who were at the time around the coach.

Other witnesses were examined, and on its being ascertained to the satisfaction of the coroner and jury that the fastening down of the valve was the act of the deceased, the coroner observed that had the deceased survived, and any other person met his death, in that case the deceased would have taken his trial for manslaughter, from his culpable negligence in the management of a thing which he, by his occupation, so well understood, it being proved that he had been for a length of time engaged in similar work, and was well aware of the nature and operations of steam.

The jury having minutely examined the boiler and engines of the coach in question, as also of another coach upon the same construction, and which was put at work for the purpose, and all its parts being explained to them, brought in the following verdict—"Accidental death, *caused by the deceased's own negligence.*" The jury added, that they were quite of opinion that Mr. Hancock's boiler, from its peculiar construction, was as free from danger as any boiler could be; in which opinion they were borne out on their examination of the body of the deceased, which was not at all mutilated; neither was the machinery nor the body of the coach injured. The deceased, who bore the character of a steady workman, was twenty-eight years of age, and has left a widow and three children to deplore his loss.

[*Mech. Mag.*

Kyan's Remedy for the Dry Rot.

Mr. Kyan's process is simply this:—He immerses the wood in a solution of corrosive sublimate, (one pound of the sublimate to five gallons of water,) till it is thoroughly saturated.

In compliance with an order of the Navy Board, Mr. Kyan prepared nine pieces of oak, sent him from Woolwich yard, where nine duplicate pieces were retained, all being marked by the proper officer. Of these specimens, five pieces, with their duplicates, were on the 9th and 10th of August, 1831, inserted in timber totally decayed with dry rot, in the Thalia frigate, stationed in the river at Woolwich; one other piece and its duplicate in the decayed timber of the dry-dock; and the three remaining pieces and their duplicates in the before named pit at Woolwich yard. In February, 1832, Mr. K. had the whole of the nine pieces and their duplicates inspected, when the entire of those prepared by him were found in the most perfect state of preservation, without spot or blemish, while all the unprepared duplicates had taken the infection, being covered with fungus mould. Mr. Kyan, therefore, on the 29th of February last, addressed the Lords of the Admiralty, requesting an inspection and report thereon by the proper officer, to which he received a reply, stating that the matter would receive further attention and consideration by government, and the result of these reports, when received, be communicated to him in due course. In the meanwhile, "by the advice, and under the kind recommendation of some of the Lords of the Admiralty," he took out a patent, 31st March, 1832, for his invention, and their Lordships have been pleased to say they will purchase of him the privilege of its use for his Majesty's yards, leaving him at liberty to sell to other governments, and to the public generally."

Mr. K. states that the invention is equally useful as a preserver of canvass and cordage, and that he has several pieces of canvass prepared by him with his solution, which have been submitted to the strongest test; having been for six months in damp, in a foul cellar, but are in nowise deteriorated, whilst the duplicate pieces in their natural state are totally covered with mildew, and are, for the most part, rotten.

Mr. K. states it to be "a well known fact, that no piece of timber was ever found to sustain itself in soundness half so long as Mr. Kyan's has done in the pit at Woolwich;" and that it "usually gives way in about six to nine months." Of the nine prepared pieces and duplicates, four were of seasoned, and two of unseasoned, or fresh, English oak, and three of American oak.

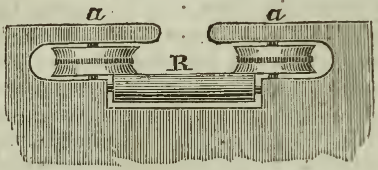
The time required for saturating any description of timber is about fourteen days, and it is fully seasoned within two months from that period. The process imparts no colour whatever. [*Ibid.*

Improved Leading Blocks.

Sir,—On examining some "leading blocks," as they are technically called, a short time since, I was struck with the appearances which many of them presented. In some, the pulley had set fast, and one side had been cut into by the rope, while in all, the way between

the pulley was cut into deep grooves; evidently showing the existence of great mechanical disadvantage, where the reverse would have been highly desirable.

It occurred to me at the time, that a little addition would make a great improvement in this useful machine, and I send a sketch of a method of construction that would be found very much superior to those at present employed.



The annexed sketch represents the side of a ship, or dock, &c. &c. *a a* are two gun metal sheaves, turning on iron axes, and having more end play than is usual. The sheaves rest upon a metal roller, R, which runs freely upon an iron axis.

The roller should be closed in, about half way up, both on the outside and within.* The framing of the block should be lined with iron, and the whole kept well greased, to reduce the friction and prevent corrosion. With this form of block, the friction, and, consequently, the labour, as well as the wear and tear of ropes, would be greatly reduced.

For, if the rope happened not to run against either of the sheaves, it would still work upon the roller, where motion would be almost as free. If the rope took into a sheave, that and the roller would turn together; the other sheave would be at liberty to turn with the roller, the friction between them most likely being sufficient to communicate motion.

The increased efficiency and durability of these blocks, would amply repay the additional expenses of construction.

Yours, respectfully,
W. Baddeley.

London, Sept. 27, 1832. [*Mech. Mag.*

Consumption of Silk.

The quantity of this material used in England alone amounts each year to more than four millions of pounds weight, for the production of which myriads upon myriads of insects are required. Fourteen thousand millions of animated creatures annually live and die to supply this corner of the world with an article of luxury! If astonish-

* Omitted in the sketch for the sake of distinctness, nor is it absolutely necessary.

ment be excited at this fact, let us extend our view into China, and survey the dense population of its widely-spread region, whose inhabitants, from the emperor on his throne to the peasant in the lowly hut, are indebted for their clothing to the labours of the silk-worm. The imagination, fatigued with the flight, is lost and bewildered in contemplating the countless numbers which every successive year spin their slender threads for the service of man.

[*Rep. Pat. Inv.*

Domestic Yeast.

Persons who are in the habit of making domestic bread, cake, &c. can easily manufacture their own yeast by attending to the following directions:—Boil one pound of good flour, a quarter of a pound of brown sugar, and a little salt, in two gallons of water for one hour. When milk warm, bottle it, and cork it close, and it will be fit for use in twenty-four hours. One pint of the yeast will make eighteen pounds of bread. [*Ibid.*

Caoutchouc.

Few persons are, perhaps, aware of the comparatively late introduction of Indian rubber into this country. The following notice is appended by Dr. Priestly to the preface to his "*Familiar Introduction to the Theory and Practice of Perspective*," printed in 1770; and it will be observed that no name is given to the substance described: "Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a black-lead pencil. It must, therefore, be of singular use to those who practice drawing. It is sold by Mr. Nairne, Mathematical instrument maker, opposite the Royal Exchange. He sells a cubical piece, of about half an inch, for three shillings, and he says it will last several years." [*Philos. Mag.*

Hot Air Blast.

It appears from a paper by Mr. T. B. Neilson, lately read at the Institution of Civil Engineers, that the weekly consumption of coals at the Clyde Iron Works has been reduced by the adoption of the heated blast, from eighteen hundred, to six hundred tons; while at the same time, a greater quantity of iron has been manufactured.

[*Mech. Mag.*

¶ Popular Science.

No. III.

Selections from Letters on Natural Magic.

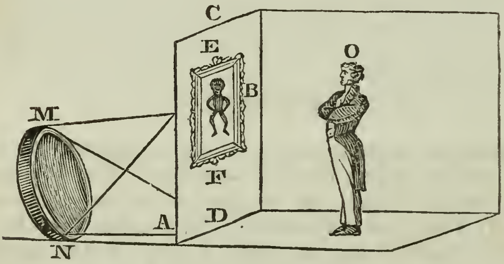
By Sir David Brewster.

(Continued from p. 215.)

Deceptions with the Concave Mirror.

The concave mirror is the staple instrument of the magician's cabinet, and must always perform a principal part in all optical combinations. In order to be quite perfect, every concave mirror should have its surface elliptical, so that if any object is placed in one focus of the ellipse, an inverted image of it will be formed in the other focus. This image, to a spectator rightly placed, appears suspended in the air, so that if the mirror and the object are hid from his view, the effect must appear to him almost supernatural.

Fig. 4.



The method of exhibiting the effect of concave mirrors most advantageously is shown in fig. 4, where CD is the partition of a room having in it a square opening EF, the centre of which is about five feet above the floor. This opening might be surrounded with a picture frame, and a painting which exactly filled it might be so connected with a pulley that it might be either slipped aside, or raised so as to leave the frame empty. A large concave mirror MN is then placed in another apartment, so that when any object is placed at A, a distinct image of it may be formed in the centre of the opening EF. Let us suppose this object to be a plaster cast of any object made as white as possible, and placed in an *inverted* position at A. A strong light should then be thrown upon it by a powerful lamp, the rays of which are prevented from reaching the opening EF. When this is done, a spectator placed at O will see an erect image of the statue at B, the centre of the opening—standing in the air, and differing from the real statue only in being a little larger, while the apparition will be wholly invisible to other spectators placed at a little distance on each side of him.

If the opening EF is filled with smoke rising either from a chafing-dish, in which incense is burnt, or made to issue in clouds from some opening below, the image will appear in the middle of the smoke depicted upon it as upon a ground, and capable of being seen by those spectators who could not see the image in the air. The rays of light, in place of proceeding without obstruction to an eye at O, are reflected, as it were, from those minute particles of which the smoke is composed, in the same manner as a beam of light is rendered more visible by passing through an apartment filled with dust or smoke.

It has long been a favourite experiment to place at A a white and strongly illuminated human skull, and to exhibit an image of it amid the smoke of a chafingdish at B; but a more terrific effect would be produced if a small skeleton, suspended by invisible wires, were placed as an object at A. Its image suspended in the air at B, or painted upon smoke, could not fail to astonish the spectator.

The difficulty of placing a living person in an inverted position, as an object at A, has no doubt prevented the optical conjurer from availing himself of so admirable a resource; but this difficulty may be removed by employing a second concave mirror. This second mirror must be so placed as to reflect towards MN the rays proceeding from an erect living object, and to form an inverted image of this object at A. An erect image of this inverted image will then be formed at B, either suspended in the air or depicted upon a wreath of smoke. This aerial image will exhibit the precise form and colours and movements of the living object, and it will maintain its character as an apparition if any attempt is made by the spectator to grasp its unsubstantial fabric.

A deception of an alarming kind, called the *mysterious dagger*, has been long a favourite exhibition. If a person with a drawn, and highly polished dagger, illuminated by a strong light, stands a little farther from a concave mirror than its principal focus, he will perceive in the air between himself and the mirror, an inverted and diminished image of his own person with the dagger similarly brandished: if he aims the dagger at the centre of the mirror's concavity, the two daggers will meet point to point, and by pushing it still farther from him towards the mirror, the imaginary dagger will strike at his heart. In this case it is necessary that the direction of the real dagger coincides with a diameter of the sphere of which the mirror is a part; but if its direction is on one side of that diameter, the direction of the imaginary dagger will be as far on the other side of the diameter, and the latter will aim a blow at any person who is placed in the proper position for receiving it. If the person who bears the real dagger, is therefore placed behind a screen, or otherwise concealed from the view of the spectator, who is made to approach to the place of the image, the thrust of the polished steel at his breast will not fail to produce a powerful impression. The effect of this experiment would no doubt be increased by covering with black cloth the person who holds the dagger, so that the image of his hand only should be seen, as the inverted picture of him would take away from the reality of the appearance. By using two mirrors, indeed, this defect might be

remedied, and the spectator would witness an exact image of the assassin aiming the dagger at his life.

The common way of making this experiment is to place a basket of fruit above the dagger, so that a distinct aerial image of the fruit is formed in the focus of the mirror. The spectator having been desired to take some fruit from the basket, approaches for that purpose, while a person properly concealed withdraws the real basket of fruit with one hand, and with the other advances the dagger, the image of which, being no longer covered by the fruit, strikes at the body of the astonished spectator.

The powers of the concave mirror have been likewise displayed in exhibiting the apparition of an absent or deceased friend. For this purpose a strongly illuminated bust or picture of the person is placed before the concave mirror, and a distinct image of the picture will be seen either in the air, or among smoke in the manner already described. If the background of the picture is temporarily covered with lampblack, so that there is no light about the picture but what falls upon the figure, the effect will be more complete.

Magic Lanterns.

The power of the magic lantern has been greatly extended by placing it on one side of the transparent screen of taffetas which receives the images, while the spectators are placed on the other side, and by making every part of the glass sliders opaque, excepting the part which forms the figures. Hence all the figures appear luminous on a black ground, and produce a much greater effect with the same degree of illumination. An exhibition depending on these principles was brought out by Mr. Philipstal in 1802, under the name of the *Phantasmagoria*, and when it was shown in London and Edinburgh it produced the most impressive effects upon the spectators. The small theatre of exhibition was lighted only by one hanging lamp, the flame of which was drawn up into an opaque chimney, or shade, when the performance began. In this "darkness visible" the curtain rose, and displayed a cave with skeletons and other terrific figures in relief upon its walls. The flickering light was then drawn up beneath its shroud, and the spectators in total darkness found themselves in the middle of thunder and lightning. A thin transparent screen had, unknown to the spectators, been let down after the disappearance of the light, and upon it the flashes of lightning, and all the subsequent appearances were represented. This screen, being half way between the spectators and the cave which was first shown, and being itself invisible, prevented the observers from having any idea of the real distance of the figures, and gave them the entire character of aerial pictures. The thunder and lightning were followed by the figures of ghosts, skeletons, and known individuals, whose eyes and mouth were made to move by the shifting of combined sliders. After the first figure had been exhibited for a short time, it began to grow less and

less, as if removed to a great distance, and at last vanished in a small cloud of light. Out of this same cloud the germ of another figure began to appear, and gradually grew larger and larger, and approached the spectators till it attained its perfect development. In this manner the head of Doctor Franklin was transformed into a scull; figures which retired with the freshness of life, came back in the form of skeletons, and the retiring skeletons returned in the drapery of flesh and blood.

The exhibition of these transmutations was followed by spectres, skeletons, and terrific figures; which, instead of receding and vanishing as before, suddenly advanced upon the spectators, becoming larger as they approached them, and finally vanished by appearing to sink into the ground. The effect of this part of the exhibition was naturally the most impressive. The spectators were not only surprised but agitated, and many of them were of opinion that they could have touched the figures. M. Robertson at Paris, introduced along with his pictures the direct shadows of living objects, which imitated coarsely the appearance of those objects in a dark night or by moonlight.

All these phenomena were produced by varying the distance of a magic lantern from a screen, which remained fixed, and at the same time keeping the image upon the screen distinct by increasing the distance of the object from the sliders in the tube. When the lantern approached the screen, the circle of light, or the section of the cone of rays from the lens, gradually diminished, and resembled a small bright cloud, when the lens was close to the screen. At this time a new figure was put in, so that when the lantern receded from the screen, the old figure seemed to have been transformed into the new one. Although the figure was always at the same distance from the spectators, yet, owing to its gradual diminution in size, it necessarily appeared to be retiring to a distance. When the magic lantern was withdrawn from the screen, and the object lens at the same time brought nearer to the slide, the image on the screen gradually increased in size, and therefore seemed in the same proportion to be approaching the spectators.

Superior as this exhibition was to any representation that had been previously made by the magic lantern, it still laboured under several imperfections. The figures were badly drawn, and in other respects not well executed, and no attempt whatever was made to remove the optical incongruity of the figures becoming more luminous when they retired from the observer, and more obscure when they approached to him. The variation of the distance of the lens from the sliders was not exactly adapted to the motion of the lantern to and from the screen, so that the outline of the figures was not equally distinct during their variations of magnitude.

Tambouring by Machinery.

The tambouring of muslins, or the art of producing upon them or-

namental flowers and figures, has been long known and practised in Britain, as well as in other countries; but it was not long before the year 1790 that it became an object of general manufacture in the west of Scotland, where it was chiefly carried on. At first it was under the direction of foreigners, but their aid was not long necessary, and it speedily extended to such a degree as to occupy, either wholly or partially, more than 20,000 females. Many of these labourers lived in the neighbourhood of Glasgow, which was the chief seat of the manufacture; but others were scattered through every part of Scotland, and supplied by agents with work and money. In Glasgow, a tambourer of ordinary skill could not earn more than five or six shillings a week by constant application; but to a labouring artisan who had several daughters, even these low wages formed a source of great wealth. At the age of five years, a child capable of handling a needle was devoted to tambouring, even though it could not earn more than a shilling or two in a week; and the consequence of this was that female children were taken from school, and rendered totally unfit for any social or domestic duty. The tambouring population was therefore of the worst kind, and it must have been regarded as a blessing rather than as a calamity when the work which they performed was intrusted to regular machinery.

Mr. John Duncan of Glasgow, the inventor of the tambouring machinery, was one of those unfortunate individuals who benefit their species without benefitting themselves, and who died in the meridian of life the victim of poverty, and of national ingratitude. He conceived the idea of bringing into action a great number of needles at the same time, in order to shorten the process by manual labour, but he at first was perplexed about the diversification of the pattern. This difficulty, however, he soon surmounted by employing two forces at right angles to each other, which gave him a new force in the direction of the diagonal of the parallelogram, whose sides were formed by the original forces. His first machine was very imperfect; but after two years' study he formed a company, at whose expense six improved machines were put in action, and who secured the invention by a patent. At this time the idea of rendering the machine automatic had scarcely occurred to him; but he afterwards succeeded in accomplishing this great object, and the tambouring machines were placed under the surveillance of a steam engine. Another patent was taken for these improvements. The reader who desires to have a minute account of these improvements, and of the various parts of the machinery, will be amply gratified by perusing the inventor's own account of the machinery in the article "Chain-work," in the Edinburgh Encyclopedia. At present it will be sufficient to state, that the muslin to be tamboured was suspended vertically in a frame which was capable of being moved both in a vertical and a horizontal direction. Sixty or more needles lying horizontally occupied a frame in front of the muslin web Each of these working needles, as they are called, was attended by a feeding needle, which, by a circular motion round the working needle, lodged upon the stem of the latter the loop of the thread. The sixty needles then penetrated the web,

and in order that they might return again without injuring the fabric, the barb or eye of the needle, which resembled the barb of a fishing hook, was shut by a slider. The muslin web then took a new position by means of the machinery which gave it its horizontal and vertical motion, so that the sixty needles penetrated it at their next movement at another point of the figure or flower. This operation went on till sixty flowers were completed. The web was then slightly wound up, that the needles might be opposite that part of it on which they were to work another row of flowers.

The flowers were generally at an inch distance, and the rows were placed so that the flowers formed what are called diamonds. There were seventy-two rows of flowers in a yard, so that in every square yard there were nearly 4000 flowers, and in every piece of ten yards long 40,000. The number of loops or stitches in a flower varied with the pattern, but on an average there were about thirty. Hence the number of stitches in a yard were 120,000, and the number in a piece is 1,200,000. The average work done in a week by one machine was fifteen yards, or 60,000 flowers, or 1,800,000 stitches, and by comparing this with the work done by one person with the hand, it appears that the machine enabled one person to do the work of twenty-four persons.

Art of Breathing Flame.

One of the most ancient feats of magic was the art of breathing flame,—an art which even now excites the astonishment of the vulgar. During the insurrection of the slaves in Sicily in the second century before Christ, a Syrian named Eumus acquired by his knowledge the rank of their leader. In order to establish his influence over their minds, he pretended to possess miraculous power. When he wished to inspire his followers with courage, he breathed flames or sparks among them from his mouth, at the same time that he was rousing them by his eloquence. St. Jerome informs us that the Rabbi Barchochebas, who headed the Jews in their last revolt against Hadrian, made them believe that he was the Messiah, by vomiting flames from his mouth; and at a later period, the Emperor Constantius was thrown into a state of alarm when Valentinian informed him that he had seen one of the body guards breathing out fire and flames. We are not acquainted with the exact methods by which these effects were produced; but Florus informs us that Eunus filled a perforated nut shell with sulphur and fire, and having concealed it in his mouth, breathed gently through it while he was speaking. This art is performed more simply by the modern juggler. Having rolled together some flax or hemp, so as to form a ball the size of a walnut, he sets it on fire and allows it to burn till it is nearly consumed; he then rolls round it while burning some additional flax, and by these means the fire may be retained in it for a considerable time. At the commencement of his exhibition he introduces the ball into his mouth, and while he

breathes through it the fire is revived, and a number of burning sparks are projected from his mouth. These sparks are too feeble to do any harm, provided he inhales the air through his nostrils.

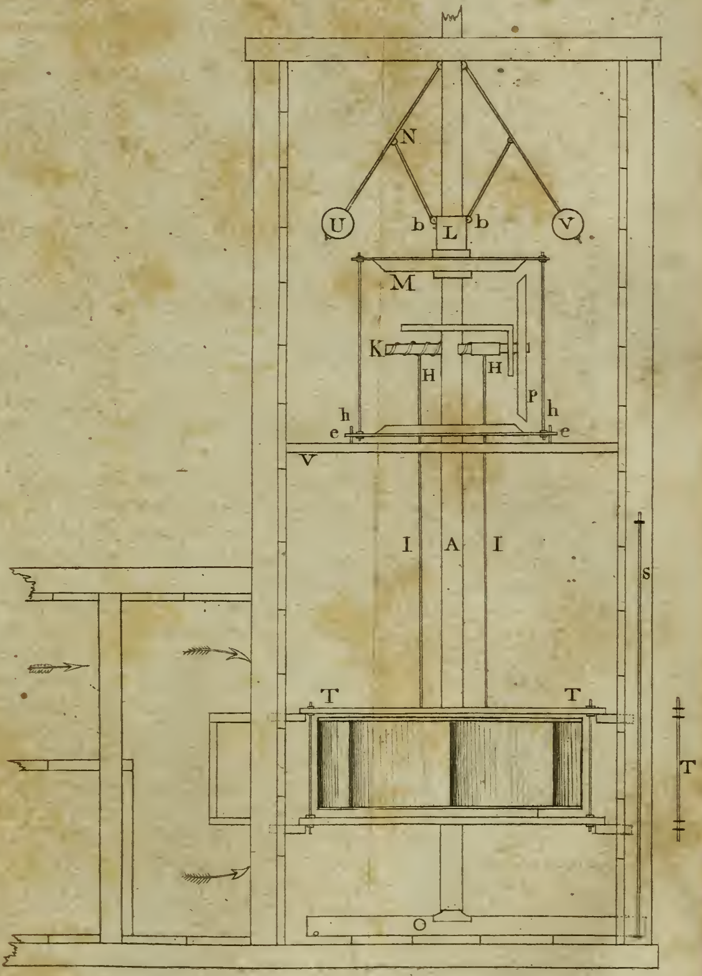
[TO BE CONTINUED.]

Meteorological Observations for February, 1833.

Moon.	Days.	Therm. Sun-rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	15°	29°	29.90	29.95	8°	NW.	Moderate.		Clear day.
	2	15	20	30.00	30.00	14	W.	do.		Cloudy—clear.
	3	18	28	29.93	29.93	10	W.	do.		Clear—cloudy.
	4	19	28	30.00	30.00	11	W.	do.		Clear day.
☺	5	21	32	.00	.00	20	NW. SW.	do.	0.40	Clear: light cl'ds: snow in n't.
	6	31	39	29.94	29.64	20	S. W.	do.		Cloudy—clear.
	7	16	22	.76	.76	2	W.	Blustering.		Flying clouds—clear.
	8	13	29	30.00	30.10	8	W.	Calm.		Clear day.
	9	28	38	29.80	29.80	27	SSW. SW.	Moderate.		Clear day.
	10	33	49	.90	.80	34	SE. E.	Calm.		Clear—hazy.
☾	11	34	30	.90	30 00	25	NE. SE.	Moderate.		Cloudy—hail.
	12	30	32	.70	29.70	38	E. SE.	do.		Fog and sleet—rain.
	13	30	34	.70	.50	36	SE.	do.	0.60	Drizzle—rain.
	14	26	32	.70	.90	20	WNW.W.	do.		Flying clouds—rain.
	15	26	29	30.05	.94	26	E.	Blustering.	1.00	Cloudy—snow, 8½ inches.
	16	19	32	.10	30.15	23	W.	Moderate.		Clear day.
	17	26	40	29.95	29.85	33	SW. S.	do.		Cloudy—clear.
	18	36	49	.45	.45	43	SW. S.	do.		Heavy fog—flying clouds.
⊗	19	48	42	.50	.50	40	S.	Calm.	0.26	Rain—foggy.
	20	37	51	.62	.62	40	WSW.	Moderate.		Cloudy—flying clouds.
	21	22	30	.90	.90	9	NW. W.	Blustering.		Flying clouds—do.
	22	24	43	30.00	.90	14	WSW. S.	do.		Clear, do.
	23	30	51	29.80	.80	27	SW. W.	Moderate.		Clear, do.
	24	32	52	.70	.43	39	SE. S.	do.	0.40	Cl'dy: clear: snow in even. 10
	25	13	22	.80	.90	4	W.	Blustering.		Clear day. [A.M., therm. at 13
☽	26	14	34	30.25	30.20	18	W.	do.		Clear day.
	27	38	47	29.80	29.80	24	SW. W.	do.		Cloudy—clear.
	28	22	24	30.00	30.00	7	SE.	Calm.	.30	Cloudy— snow.
	Mean	25.57	35.28	29.86	29.84	22.11			2.96	

	Thermometer.	Barometer.
Maximum height during the month,	52. on 24th.	30.25 on 26th.
Minimum do. . .	13. on 8th. & 25th.	29.43 on 24th.
Mean do. . .	30.42 . .	29.85

R. EASTMAN'S REACTION WHEEL.



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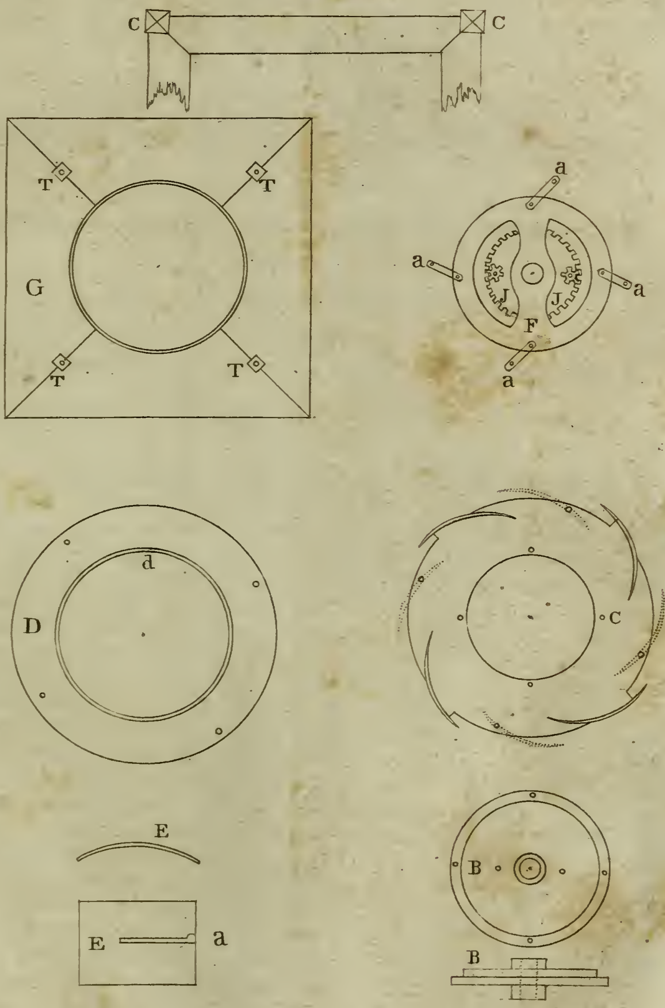

JOURNAL

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State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

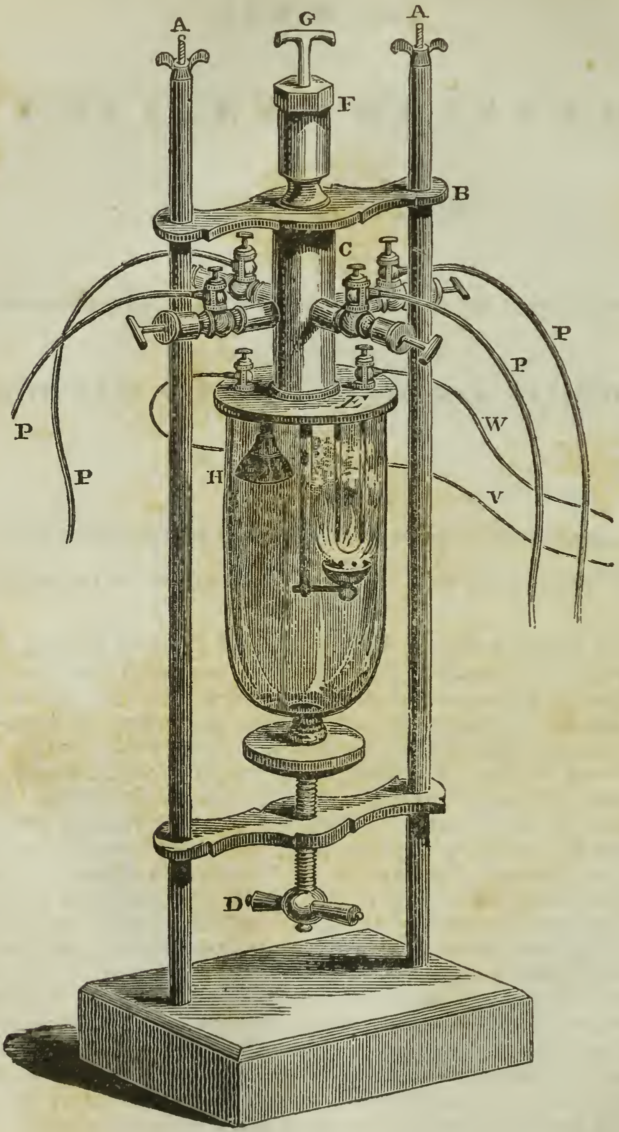
MAY, 1833.

Apparatus for evolving Silicon from Fluo-silicic Acid Gas.

By Robert Hare, M. D. Professor of Chemistry in the University of Pennsylvania.

Into a stout mahogany block as a basis, two iron rods A, A, are so planted as to extend perpendicularly, and of course parallel to each other, about two feet in height. Upon these rods two iron bars are supported horizontally, one, B, near their upper extremities, the other at the height of about six inches from the wooden basis. In the centre of the lower bar, there is a screw, D, having a handle below the bar, and supporting above it a circular wooden block. Into a hole in the upper iron bar, equidistant from the rods, is inserted a hollow brass cylinder C, which at the lower end screws into an aperture in a circular plate of brass, E, which is thus supported horizontally a few inches below the bar. By these means room is allowed for the insertion into the cylinder of four valve cocks, each furnished with a gallows screw. The cylinder is surmounted by a stuffing box, through which a copper sliding rod, G, passes air tight. The brass plate is turned and ground to fit a bell glass of about five inches in diameter, and eight inches in height, which is pressed up when necessary between the plate and the block by the screw D, supporting the block. Within the space comprised by the bell glass, and on one side of the centre of the plate, two stout brass wires are inserted, one of them insulated by a collar of leathers, so as to admit of the ignition, by a galvanic discharge, of a small arch of platina wire, which terminates them. The sliding rod above-mentioned as occupying

the stuffing box, terminates below the plate in an elbow which supports a cap at right angles to the rod, at the same distance from the



rod as the platina wire; and on the opposite side of it, there is a brass cover, H, for the cap, supported from the plate. The arrange-

ment is such that by a suitable movement in the sliding rod, made by grasping it by the handle G, in which it terminates externally, the cup may be made either to receive into its cavity the platina wire, or be made to adjust itself to its cover H.

The bell being removed, about sixty grains of potassium, in pieces not containing more than fifteen grains each, are to be introduced into the cup, which is then to be adjusted to the cover, and the bell secured. In the next place, by means of the flexible lead tubes, P, P, P, P, and the gallows screws attached to the valve cocks, establish a communication severally with an air pump, a self-regulating reservoir of hydrogen, a barometer gauge, and a jar over the mercurial cistern containing fluo-silicic acid gas. First by means of the air pump exhaust the bell, and in order to wash out all remains of atmospheric air, admit hydrogen from the reservoir. Again exhaust and again admit hydrogen. Lastly exhaust the bell of hydrogen and admit the fluo-silicic acid gas. By means of the gauge, the exhaustion is indicated and measured, and by the same means it will be seen when the pressure of the gas within the bell approaches that of the atmosphere. When this takes place, the cocks being all closed, by means of a calorimotor, the platina wire is to be ignited, and the potassium brought into contact with it.

A peculiar deep red combustion ensues, evolving copiously chocolate coloured fumes, which condensing into flocks of the same hue, subside throughout the receiver, like a snow in miniature, excepting the colour. On removing the bell after the potassium is consumed, the cup which held it, will be found to contain silicon mixed with the fluoride of potassium, and with this indeed the whole of the powder deposited is contaminated. Siliciuret of potassium is likewise formed in the cup, since on the affusion of water, a fetid evolution of siliciuretted hydrogen ensues. By washing, the silicon, being insoluble, is left in the state of a chocolate coloured powder.

According to Berzelius' directions, I have washed the silicon first with cold, and afterwards with boiling water, in order to purify it.

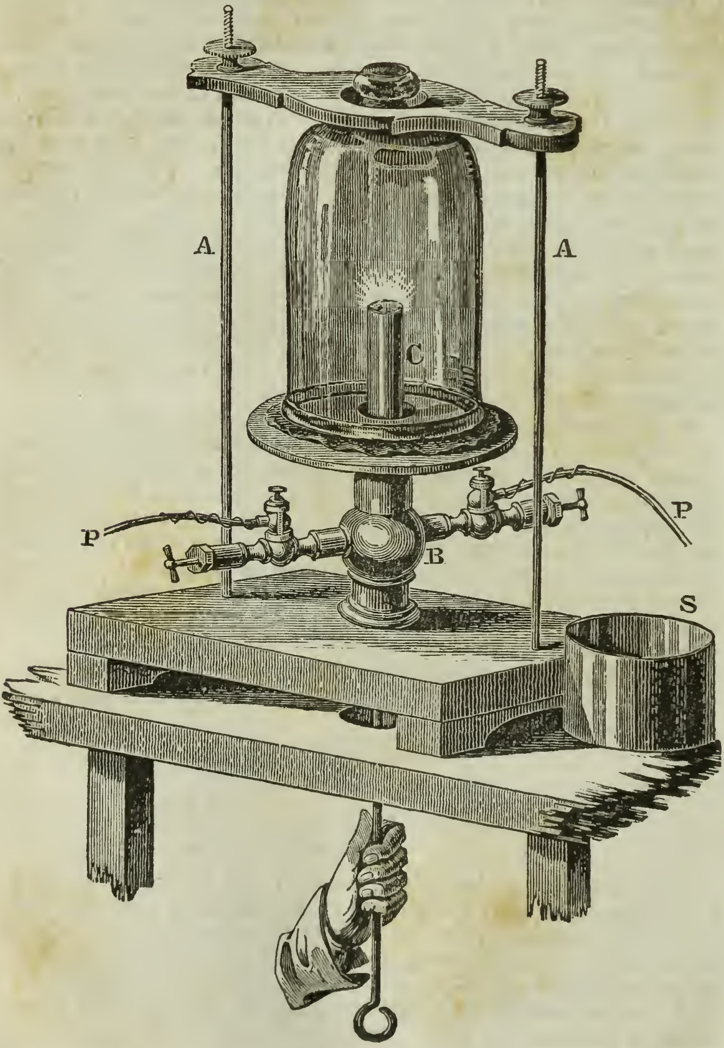
Improved process for the evolution of Boron.

By the author of the preceding article.

By means of an apparatus represented in the annexed engraving, I have succeeded in evolving boron by the reaction of potassium with vitrified boracic acid, in vacuo, without encountering the evil of any explosive action, to which the process, as heretofore conducted, in pleno, has been found liable.

A circular brass plate, is prepared, like the plate of an air pump, so as to produce with any suitable receivers properly ground, an air-tight juncture. It is supported on the upper end of a hollow brass cylinder, B, with the bore of which it has a corresponding aperture. The brass cylinder is about three inches in diameter, and six inches in height, being inserted at its lower end into a block of

wood as a basis. This cylinder receives below, a screw, which supports a copper tube, C, of about two inches in diameter, so as to have its axis concentric with that of the cylinder, and to extend about four inches above the plate. The copper tube, thus supported, is



closed at the upper termination by a cup of copper, of a shape nearly hemispherical, and soldered at the upper edge, to the edge of the tube; so that the whole of the cavity of the cup, is within that of the tube.

Hence the bottom of the cup is accessible to any body, not larger than the bore of the tube, without any communication arising between the cavity of the tube, and that of any receiver placed upon the plate, over the cup and tube, as in the figure.

Into the side of the cylinder supporting the plate, a valve cock is screwed, by means of which, and a flexible leaden tube, a communication with an air-pump is opened, or discontinued, at pleasure.

The cup being first covered with a portion of the vitrified boracic acid, as anhydrous as possible, and finely pulverized, the potassium is introduced, and afterwards covered with a further portion of the same acid, two parts of the potassium being used for one of the acid. A large glass receiver is now to be placed on the plate, secured by rods A, A, concentric with the tube and cup; from the heat of which the glass is to be protected by a bright cylinder of sheet brass, S, placed around it so as to be concentrical with the receiver and tube.

The apparatus being so far prepared, an incandescent iron is introduced through the bore of the tube, so as to touch the bottom of the copper cup. In a short time a reaction commences, which aiding the influence of the hot iron, renders the cup and its contents red hot. A deep red flame appears throughout the mass, after which the reaction lessens, and the heat declines.

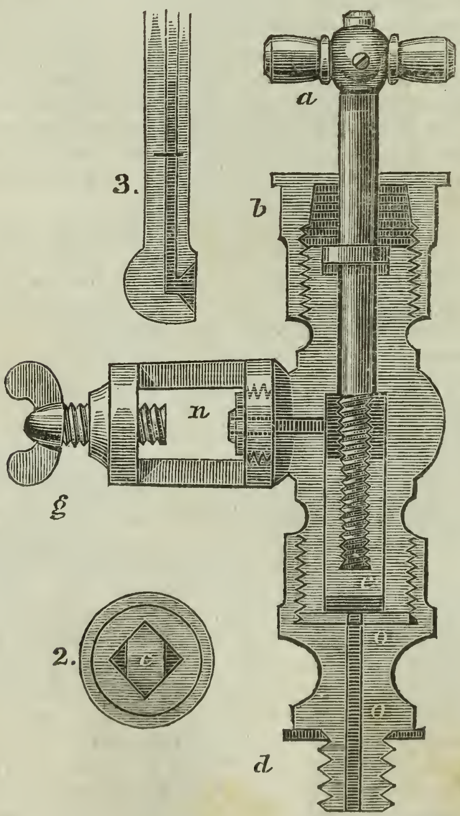
When the cup has become cold, the air is admitted into the receiver, and the contents are washed with water. If any of the acid has escaped decomposition, it may be removed by boiling the mass with a solution of potash or soda. After this treatment and due desiccation, a powder will remain, having the characteristic colour and properties of boron.

The additional valve cock, represented in the figure, gives the option of introducing dry hydrogen for the purpose of washing out atmospheric air, as described in the process for silicon.

Description of the Valve Cock, a perfectly air-tight substitute for the common Cock. By the author of the preceding articles, in which it is referred to.

This figure is intended to illustrate the construction of a substitute for a common cock which I have been accustomed to call a valve cock. It was devised by me about twenty years ago, among a number of other analogous contrivances, and seems upon the whole less liable to fail than any other which I have tried. The engraving represents a longitudinal section of the valve cock. At *a* is a piston with a collar enclosed in the stuffing box *b*, so as to be rendered air-tight by means of oiled leather. Hence this piston may be turned or made to revolve on its axis, while incapable of other motion. Upon the end of the piston a thread for a screw is cut which fits into a female screw in the brass prism *c*, so as to cause this prism to approach to or to retreat from a bearing covered by leather, in the centre of which there is a perforation *o o* communicating with one of the orifices of the instrument. This orifice is surrounded by the male screw *d*, so that

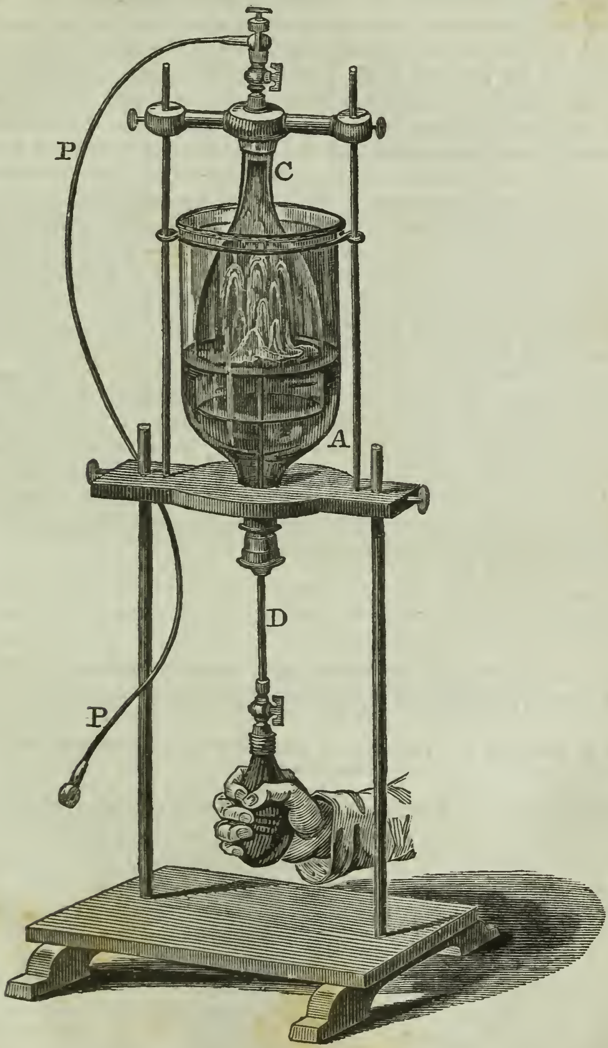
by means of this screw, the valve-cock may be fastened into any appropriate aperture, fitted to receive it, subjecting an interposed leather to such a pressure, as to create with it an air-tight juncture. The prism *c*, has two of its four edges cut off (see fig. 2,) so as to allow a free passage by it, reaching to the lateral perforation terminating in another orifice, over which there is a gallows screw, *g*. By means of this gallows screw, when requisite, a brass knob, such as that represented by fig. 3, soldered to a leaden pipe, may be fastened to the valve cock. The juncture is rendered air-tight by the pressure of the screw in the gallows upon a leather, which is kept in its place by means of the nipple *n*.



The method last mentioned, of producing an air-tight juncture, was contrived by me about seven years ago, and proves to be of very great utility. There is no other mode with which I am acquainted, of making a perfectly air-tight communication, between cavities previously separate, at all comparable to this in facility.

Apparatus contrived by Dr. Hare for separating Carbonic Oxide from Carbonic Acid, by means of Lime Water.

Lime water being introduced in sufficient quantity into the inverted bell glass, another smaller bell glass, C, is supported within it as



represented in this figure. Both of the bells have perforated necks. The inverted bell is furnished with a brass cap having a stuffing box

attached to it, through which the tube D, of copper, slides air-tight. About the lower end of this tube, the neck of a gum elastic bag is tied. The neck of the other bell is furnished with a cap and cock, surmounted by a gallows screw, by means of which a lead pipe P P, with a brass knob at the end suitably perforated may be fastened to it, or removed at any moment. Suppose this pipe, by aid of another brass knob at the other extremity, to be attached to the perforated neck of a very tall bell glass filled with water upon a shelf of the pneumatic cistern; on opening a communication between the bells, the water will subside in the tall bell glass, over the cistern, and the air of the bell glass C being drawn into it, the lime water will rise into and occupy the whole of the space within the latter. As soon as this is effected, the cocks must be closed and the tall bell glass replaced by a small one filled with water, and furnished with a gallows screw and cock. This bell being attached to the knob of the lead pipe, to which the tall bell had been previously fastened the apparatus is ready for use. I have employed it in the new process for obtaining carbonic oxide from oxalic acid, by distillation with sulphuric acid in a glass retort. The gaseous product consists of equal volumes of carbonic oxide and carbonic acid, which, being received in a bell glass communicating as above described by a pipe with the bell glass C, may be transferred into the latter, through the pipe, by opening the cocks. As the gaseous mixture enters the bell C, the lime water subsides. As soon as a sufficient quantity of the gas has entered, the gaseous mixture may, by means of the gum elastic bag and the hand, be subjected to repeated jets of lime water, and thus depurated of all the carbonic acid. By raising the water in the outer bell A, the purified carbonic oxide may be propelled, through the cock and lead pipe, into any vessel to which it may be desirable to have it transferred.

Remarks on the error of supposing that a communication with the Earth, is necessary to the efficacy of Electrical Machines.

By R. Hare, M. D., Professor of Chemistry in the University of Pennsylvania.

Sometime since, in looking over a volume of Cavallo's Electricity, I was surprised to observe that in order to give the greater efficacy to an electric machine, he advises that the cushion, or negative poles, should be made to communicate advantageously with the earth. As the means of accomplishing this object he suggests a conducting communication " with moist ground, with a piece of water, or with the iron work of the water pump."

It appears from the following passage in Turner's Chemistry, a work generally of great merit, that the erroneous impression which gave rise to these suggestions, has been adopted by a more modern author. We find, page 77, American edition, the following allegation.

"The electricity which is so freely and unceasingly evolved during the action of a good electrical machine, is derived from the great reservoir of electricity, the earth. This is obvious from the fact that if the whole apparatus is insulated, the evolution of electricity immediately ceases; but the supply is as instantly restored, when the requisite communication is made with the ground. In the state of complete insulation, the glass and prime conductor are positive as usual, and the rubber is negatively excited; but as the electricity then developed is derived solely from the machine itself, its quantity is exceedingly small. When the machine is used, therefore, the rubber is made to communicate with the earth. As soon as friction is begun, the glass becomes positive and the rubber negative; but as the latter communicates with the ground it instantly recovers the electricity which it had lost, and thus continues to supply the glass with an uninterrupted current. If the rubber is insulated, and the prime conductor communicates with the ground, the electricity of the former, and all conductors connected with it, is carried away into the earth, and they are negatively electrified."

I conceive that the earth has never, of *necessity*, any association with the phenomena of the electric machine; of which the power is evidently dependent on the efficacy of the electric, in transferring the fluid from the negative to the positive conductor. When the machine is made to act and conductors are both insulated, they are brought into states of excitement as opposite as the power of the machine is, at the time, competent to produce. If, under these circumstances, with one end of a metallic rod, (terminating in a metallic ball, or other suitable enlargement, and held by means of an insulating handle,) we touch the negative conductor, while the ball is approximated to the positive conductor, sparks at least as long, and as frequent, will be obtained, as when the negative conductor, or cushion, has the best possible communication with the earth. I conceive that any metallic surface or surfaces, duly connected with either conductor, must become virtually a part of that conductor, and partake of its excitement. In this predicament, whilst receiving a charge, are the coatings of a Leyden jar, or an association of such jars in a battery. The effect of the machine is merely to transfer the fluid from one surface to another. After the conductors, and any jar, or battery, associated with them are charged, there is no more electricity in the surfaces than before; since whatever one has gained, the other has lost.

If the impression of the learned professor were correct, how could a battery or a jar be charged, where both it, and the machine are insulated from the earth? Yet experience shows that it is under these circumstances that a charge is most easily imparted. When the conductors are in a state of excitement, and both insulated, the one will of course be as much below that of the surrounding neutral medium, and of the great reservoir, as the other is above that standard. When we connect either conductor with the earth, it returns of course to the neutral state of the earth; but the difference between the excitement of the conductors is sustained by the power of the machine to the same extent as before; hence the length and frequency of the sparks will not be found to be sensibly altered. It follows that when either of the conductors is made neutral by connexion with the earth, that the other will have its excitement as much above

or below neutrality, as the sum of the difference between each of the two conductors and the terrestrial neutrality when both are insulated. Thus supposing that when insulated, the one conductor is, relatively to terrestrial electricity, minus ten, and that the positive conductor is plus ten; when the negative conductor alone is uninsulated, the positive will be plus twenty, when the latter is alone uninsulated the former will be minus twenty.

It seems to be a common, though as I believe an erroneous idea, that a spark changes its character with the conductor from which it appears to be taken; so that when produced by presenting a body to the positive conductor, it is considered as positive, and as negative when produced with the negative conductor in like manner.

I have already observed that any conducting surface in connexion with either conductor, must act as a part of that conductor. Approximating to the negative conductor, a body (a ball, for instance,) while in communication with the positive conductor, is really enlarging or elongating the surface of the latter, so that when the spark passes, it must still be from the positive to the negative pole: and vice versa, elongating the surfaces associated with the negative conductor, till sufficiently near the positive conductor to receive a spark, does not alter the character of the phenomenon. In each case, according to the theory of one fluid, a current passes from the positive to the negative pole, and according to the doctrine of two fluids, two currents pass each other.

The cause of the difference observed in the sparks in the two cases is, that they are usually received from a small knob upon a big ball, or the hand; or some other body comparatively large.

Whenever the fluid is contracted into a small jet on the positive side, its projectile power is increased; while under the opposite circumstances, its projectile force is lessened. This is the sole cause of the long forked erratic form, of what is called the positive spark; and the short stubbed appearance of what is called the negative spark. The whole difference may be effected in whatever situation the sparks may be taken, by causing a large and a small ball to exchange sides. When the surface on the positive side is so small as to condense the electric matter before it jumps, the projectile force is greater, and, as in the case of the jet pipe in hydraulics, there is a medium size at which the greatest projectile power is obtained. When the emitting surface is too large, the projectile force is lessened, and the spark consequently made shorter.

The following passage in Cavallo's Electricity is that alluded to above. See vol. 1st, page 184: London, 1786.

"Sometimes the machine will not work well because the rubber is not sufficiently supplied with electric fluid; which happens when the table upon which the machine stands, and with which the chain of the rubber is connected, is very dry, and consequently in a bad conducting state. Even the floor and the walls of the room are in very dry weather bad conductors, and they cannot supply the rubber sufficiently. In this case the best expedient is to connect the chain of the rubber, by means of a long wire, with some moist ground, a piece of water, or with the iron work of the water pump, by which means the rubber will be supplied with as much electric fluid as is required."

The learned author is, I think, altogether wrong in imagining that the dryness of adjacent bodies can have any ill effect. In common with the great mass of electricians of this time, as well as his contemporaries, he has overlooked a real cause of deterioration. I allude to the imperfect conducting power of cushions, made as they are usually, of silk, or leather stuffed with hair, or other nonconducting substances. The desiccation of the cushion and other parts of the rubber, may counteract the benefit otherwise produced by any increase of aridity in the surrounding medium.

By stuffing the cushions with the elastic iron shreds scraped off from weaver's reeds in manufacturing them, and making a communication between the shreds and the steel spring supporting the cushion and attached to the negative conductor, I have seen the sparks yielded by a machine more than trebled in length, and frequency.

As a coating for the cushion, upon the whole, I find the aurum musivum, more efficacious than the amalgam usually employed, which is apt to adhere to the glass, and promote the passage of sparks from the cushion to the collecting points of the positive conductor. I question if the amalgam does not owe its efficacy to its conducting power, which tends to compensate the absence of this property in the cushion.

In speaking of experiments performed by means of electrical machines, the poles and conductors may in general be treated as synonimous; yet strictly the poles are those parts of the conductors, or conducting surfaces in connexion with them, between which the discharge takes place; so that when insulated metallic rods, however long, are each at one end in contact with the conductors of the machine, the poles may be at the other ends of the rods. This view of the subject is generally recognised in the case of Voltaic series, which not being terminated by conductors, in the technical sense used in speaking of the machine, gives rise, in this respect, to less cause of misapprehension.

I conceive it an error to suppose that the association of a large conductor with a machine contributes to the intensity of the sparks. It appears to me to render the sparks shorter, and less frequent, though otherwise larger.

Nötice of the application of the process of transferring to the art of Die Sinking.

By Franklin Peale, Lecturer on Machines in the Franklin Institute.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Several years since it was desirable in the management of the Philadelphia Museum, to be possessed of appropriate medals; for the accomplishment of this object, dies, the device of which was a portrait of Charles W. Peale, were executed in a most satisfactory manner by Mr. C. Gobrecht. One of these dies was unfortunately cracked in the hardening, and thus rendered useless.

It subsequently became still more desirable that this object should

be carried into execution, and that the likeness of the founder of the museum should be preserved. A prosecution of the subject led to the results which I will now state.

In the spring of 1825, Mr. M. W. Baldwin, aware of the applicability of the process of transferring, to die sinking for coinage, made at that time a transfer press, with which Mr. Kneass, of the United States Mint, made a perfectly successful experiment in the workshop of the former.

The object above stated led to a revival of this process, and its prosecution to completion, and I have now the pleasure to present to the Institute one of those medals, stuck in silver, from dies which were made in the fall of 1832 by *transfer*, from the originals engraved by Mr. Gobrecht. I do not offer this medal as a sample of workmanship in this department of the arts: the first specimen in any art is generally, from that circumstance alone, inferior; but it is offered as a creditable specimen, and at the same time a satisfactory demonstration that the process of transferring is applicable to die sinking, with advantages that may be stated in a few words. The first of these advantages is great economy of labour. Any required number of dies may be taken from the original roller, all of them being fac similes of the original die. The process exercises, also, an advantageous effect on the metal, in raising it gently, and by successive efforts, with an equal condensation of the particles throughout all the portions of its surface, admitting at the same time of as many annealings as the *relief* of the device may require; of which the limits, as far as I can judge from my experience, are beyond the requisite elevation. From these facts I am fully authorized in believing that the risk of loss of the nearly finished work by cracking, in hardening, is much reduced.

A brief notice of the process, (which is applicable to all kinds of dies,) for general information, is all that I need offer, as an intimate knowledge could only be acquired by conducting it.

The die is engraved in the usual manner, except that it has a greater width of margin. It is then hardened and placed in the press, in contact with a soft roll, and subjected to the necessary pressure and roller, with occasional annealings, as may be found necessary, the frequency of which will depend on the depth of the device. The roll is then hardened, and the operation repeated with the substitution of a soft die, to receive the impression from the hardened roll; the die is then prepared and hardened in the usual manner; the roll being preserved to repeat the transfers, as often as may be desired.

The process of transfer is now used in the engraving department of the U. S. Mint, under the direction of Mr. Wm. Kneass, to whose liberal aid I am much indebted in the prosecution of this process to its successful completion.

I have the honour to be,

Very respectfully, yours,

FRANKLIN PEALE.

Philadelphia, April 24, 1832.

FRANKLIN INSTITUTE.

Proceedings of the second Monthly Meeting for Conversation on Mechanical Subjects. Thursday, March.

Mr. Franklin Peale exhibited a speaking and a laughing figure, and explained the mechanism of the former by referring to a model in which all the parts were enlarged. The analogy of the parts of the model to those in the mechanism essential to the human voice was satisfactorily traced, and the difficulties incident to the imitation dwelt upon.

A model illustrative of the principles of common as well as of horizontal perspective, was shown by Prof. A. D. Bache, in connexion with the "horizontorium" of Mr. Reuben S. Gilbert, which was presented at the first meeting.

The locomotive engine made for the Museum by Mr. M. W. Baldwin, was placed upon a short section of a rail-way. The construction of the engine was explained by Mr. Franklin Peale. Its analogy to, and differences from, the trial engine of Braithwaite and Ericcson, was shown, and led to a discussion of the principles of construction of the more recent locomotives.

Two transparencies, illustrative of the early history of the steam engine were placed at the upper end of the hall. They form part of a series procured with the proceeds of a contribution, by members of the Institute, towards the collection of models, &c. for the lectures on Machines.

Quarterly Meeting.

The thirty-seventh quarterly meeting of the Institute was held at their hall Thursday, April 18th, 1833.

S. J. Robbins was appointed chairman, and

C. Sherman, Recording Secretary pro. tem.

The minutes of the annual meeting were read and approved.

Donations of books were received from Messrs. Thomas Stewart, Reuben S. Gilbert, S. J. Robbins, Abrm. Miller, George Fox, S. V. Merrick, W. B. Sprague, and the Zoological Society of London, which were deposited in the library.

The Actuary laid on the table the various journals which had been received during the last three months in exchange for the Journal of the Institute, which were also placed in the library.

The Chairman of the Board of Managers read the thirty-seventh report of the Board, which was accepted, and, on motion, referred to the committee on publications, with instructions to publish such parts as they may deem expedient.

The treasurer's report for the quarter ending the 1st April, inst. was read and accepted.

Extract from the minutes.

S. J. Robbins, Chairman.

C. Sherman, Rec. Sec. pro. tem.

Thirty-seventh Quarterly Report of the Board of Managers of the Franklin Institute.

The Managers respectfully submit to the Institute an outline of the operations of the last quarter.

In the department of instruction, in addition to the regular lectures, the members have had delivered before them, a series of popular lectures on meteorology, by G. Emerson, M. D., to whom the Board take this opportunity to return thanks for the interest in the institution which prompted his exertions. It is still a matter of regret with the Board that the evenings devoted to volunteer lectures are so generally vacant, notwithstanding the many members who are entirely competent to do justice to an explanation of the branches of the useful arts to which they are devoted.

The efforts of the Professor of Chemistry to make his course useful to the workman, as well as interesting to the general student, have been acknowledged by the regular attendance of the members; those who have listened to his descriptions of the art of the gold beater, iron founder, &c. could not but have perceived that the processes had been the subjects of personal inspection, and that the descriptions were those of an eye witness.

The English school has continued to receive the patronage of the members of the Institute, but not to the extent to which its merits entitle it.

Notwithstanding the arrangements made, at the opening of this year's course, for the better accommodation of the drawing school, the number of the pupils has materially diminished. The causes which may have led to this result are under consideration by the committee on instruction.

The committees of the Board appointed since their organization in January last, have, as appears by their reports, been attentive to the duties assigned to them respectively. The committee on premiums and exhibitions have prepared and published a list of premiums for articles to be submitted at the exhibition of American manufactures to be held next autumn.

Arrangements have been made, by a special committee, to have, on the occasion of delivering the medals and premiums, to be awarded at the exhibition just referred to, a public address delivered by a distinguished citizen of a sister state. It is intended thus to follow up a practice, which was commenced by the delivery of an address by the chairman of the committee on exhibitions, in the winter of 1831.

The managers congratulate the members of the Institute on the success which has attended the commencement of the experiment of substituting conversation meetings for the formal monthly meetings heretofore held. It is hoped that the interest already excited will not be suffered to flag, and that these meetings may afford a new source of attraction to the members of the Institute.

Respectfully submitted.

A. D. BACHE, *Chairman*.

WILLIAM HAMILTON, *Actuary*.

BIBLIOGRAPHICAL NOTICE.

A Treatise on Optics, by Sir DAVID BREWSTER, *LL. D. F. R. S., &c. &c. First American edition, with an appendix by* A. D. BACHE, *Professor of Natural Philosophy and Chemistry in the University of Pennsylvania, &c.* Carey, Lea, & Blanchard, 1833.

The treatise on optics by Sir David Brewster is from the pen of the most successful experimental inquirer, in this branch of science, since the days of Newton, and coming from such a source it needs no eulogium from us. The reader will find in this work a clear statement of Sir David Brewster's discovery of the decomposition of light by *absorption*, and the consequent modification of the theory of the spectrum; his curious inquiries into the colours produced by grooved surfaces; into the laws of the double refraction and polarization of light; and the various phenomena embraced in these interesting branches of optical science. These, as well as the other parts of the subject, are treated in as popular a form as the nature of the science admits.

The motive which induces us to withhold a detailed notice of the body of the work, applies with greater force to any notice of the appendix, a statement of the object of which we give in the words of the editor's advertisement.

"The object of the following appendix is to place in the hands of the students of our colleges, a text book which will furnish them with some of the analytical methods of the most recent writers upon the elements of optics."

"The work of Sir David Brewster is from the pen of a master, and presents, in a popular form, the results which have flowed from experiment and from theory, applied to the investigation of the different branches of optics. The appendix merely aims at supplying to the student the mode of determining the results given in the text, more particularly in what relates to reflexion and refraction."

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN NOVEMBER, 1832.

*With Remarks and Exemplifications, by the Editor.**

1. For an improvement in *Stoves;* Nathan Parrish, Mendon, Monroe county, New York, November 2.

The stove here patented resembles, in its general construction, the kind ordinarily used for cooking, such as the old ten plate, or other stove of that description; to these the patentee proposes to make an addition, for the purpose of burning longer wood than they usually allow, and of throwing more heat out into the room. Suppose the fireplace door to be removed, and the opening to be surrounded by a rectangular box, each side of which is as large as the door, the door being used to form the front of it, and the lap of the stove to form its bottom; this box being fixed on to the stove plate by screws, or otherwise, the door being outwards, the fireplace will be thus lengthened to an extent equal to the sides of the box. This, it is said, will not only accomplish the purpose of burning longer wood, and throwing out more heat, but likewise improve the draft.

If instead of burning longer wood, this addition would cause wood to burn longer, we should think more favourably of the contrivance. A box of the kind described, when added to a common stove, will cover nearly the whole lap, and will not only appear unsightly, but be actually very inconvenient, as it will render it difficult to get at the coals and ashes within the fireplace, and the longer wood will be confined to the additional box.

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2. For a *Machine for manufacturing Axes,* Hatchets, and other tools; David Hinman, Winchester, Litchfield county, Connecticut, November 2.

The machinery used is described in very general terms, leaving, in its application, much to be reinvented by any one who should undertake to construct it from the specification and drawing deposited in the patent office. It appears, however, that there are to be two wedge-like pieces, the heads of which are segments of cylinders, and between these curved ends, the forging, or swageing is to be effected; there is to be a strong iron frame, within which these two pieces, which are called folding arms, are to be hung upon pins at their thinner ends. Upon the curved heads swages are to be placed, having the form adapted to the axe, or other article to be forged. These wedges, or segments, are made to vibrate by means of a crank and pitman, and, according to the drawing, they are to be forced up against each other by a kind

* In the list of patents in the last number, the following was omitted:—

48. For an improvement in the mode of *Cutting Laths by means of Circular Saws;* Francis Shumard, Cincinnati, Hamilton county, Ohio, October 31.

The specification of this patent will be found in the present number.

of windlass, thus following the metal as it enters the dies. The claim is to "the application of power, giving to the metal a squeeze or pressure in one direction only."

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3. For an improvement in the *Manufacture of Axes;* Benjamin Smith, Canton, Hartford county, Connecticut, November 2.

This patent differs altogether from the foregoing, as it is for an apparatus to be employed for finishing axes after the forging has been completed. Circular steel cutters are to be made to run in a lathe strongly mounted for that purpose. These cutters are to be employed as substitutes for the file and grindstone. One of them is made concave lengthwise, so as to be adapted to the convexity of the axe on its sides towards the cutting edge. The cutter, after being turned to the proper form, is to be grooved spirally, from end to end, so as to have cutting edges over its whole surface. Other cutters are adapted to the head, and to the back and front edges. The eye also is to be dressed, or drilled out by means of a fluted taper bit, running in the lathe; the small end of the bit working out the lower part, the same conical bit entering further to complete the upper or larger part of the eye.

The axe is to be laid on a sliding bed, where it is held by tightening screws, and advanced against the cutters by racks and pinions, or other suitable means. "The thing claimed by the applicant as his invention, is the adaptation and application of the mill, or cutter, above described, to the specific purpose of shaping axes."

Such cutters can be applied only where axes have been formed between dies so as to give to all of them precisely the same shape; they may then be used, but we much doubt, even in that case, their being found to be eligible instruments for finishing axes. They must be of hardened steel, and as they become dull they cannot be sharpened otherwise than by softening, filing, and rehardening them; the trouble and risk of which will be apt to render them inferior to the old mode of proceeding; to the drilling part we see no objection.

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4. For an improvement in the *Common Spindle for Spinning Cotton;* Nathaniel Rider, Dudley, Worcester county, Massachusetts, November 3.

The common live spindle is to be surrounded by a tube along that part of it upon which the bobbin is usually placed; this tube is to receive the bobbin, which then occupies the same part, in relationship to the flyer and whirl, which it would were the tube not there; the bobbin is also made to rise and fall on the tube as it would on the naked spindle. The advantage said to result from this is, the creation of a friction which gives an easier and more steady draft, especially when the motion is rapid. The washer, it is stated, should be much smaller than that now in use on the live spindle. The claim is to the particular form of the tube, and the metallic washer. The drawing which accompanies the specification is without written references, but those

acquainted with the subject, will perceive the nature of the thing claimed.

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5. For an improved mode of *Moving the Rudders of Ships* in steering; Elijah Soule, Duxbury, Plymouth county, Massachusetts, November 3.

The steering is to be effected by means of a cogged wheel which works in a rack, forming the segment of a circle. This circular segment is affixed to the deck, at its two ends, by metallic pillars, or standards. The hangings of the rudder are the centre of the circle of which the curved rack is a segment. The steering wheel is to be made in the ordinary way, but it has a pinion on its axis which takes into the upper side of the cog wheel, the lower side of which mashes into the rack. The uprights, which support the steering wheel and its appendages, are securely fastened on to the end of the tiller, and traverse with it in steering. There is a contrivance for keeping the rack and cog wheel in gear, and preventing derangement from blows and jerks.

The claim is to "the application of the steering wheel and pinion on its axis, and the cogged wheel to the curved rack, or segments, to produce a motion of the rudder either to the right or left."

Instead of the mode of fixing the rack and pinion above described, it is proposed sometimes to attach the rack firmly to the tiller, and the standard of the steering wheel to the deck. This latter mode we should suppose to be the best, as the steersman will then keep his station opposite to the binnacle, whilst in the former mode he has to follow the tiller towards either side of the vessel.

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6. For a *Washing Machine;* William H. Cumming, Greensboro, Guilford county, North Carolina, November 3.

The clothes, contained in a trough, are to be rubbed between a reeded cylinder, or one covered with small rollers, and a hollow segment of rollers, in a way so much like that adopted in many other washing machines. The patentee has not presented to us any thing which he claims as new, a point in which we think that he has pursued a correct course.

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7. For an improvement in the *Reaction Water Wheel;* William Hotchkiss, Windsor, Broome county, New York, November 6.

Hereafter the millwright must take especial care to place the shaft of his reaction wheel perfectly plumb, as in the patent before us the wheel makes not the slightest pretention whatever to novelty, being as like to Mr. Wing's wheel, and some others, in the arrangement of its buckets, as one pea is like another; but, says the patentee, "the parts to which I lay claim as original, are the placing the horizontal or reaction wheel in a vertical, or other position than a horizontal one, thereby, in saw mills, and in all places where a crank is used, saving the expense of gearing the same, and also of constructing said wheels

wholly, or principally, of cast iron, or other metallic substance. And also of placing more than one of said wheels on the same shaft or axle; or of coupling two or more of said shafts together," &c.

There seems to be something of a bull in the idea of placing a horizontal wheel vertical, but this would not be of much importance were there *any other* novelty in the thing proposed; it, however, happens that not only the vertical position of the said horizontal wheel, but each of the items above enumerated and claimed, are equally unfortunate in this particular. The security of the standing of these claims, therefore, is about the same with that of the "baseless fabric of a vision."

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8. For a *Machine for Pressing Paper;* Ashael H. Jervis, and Thomas Trench, Ithaca, Tompkins county, New York, November 6.

Two hollow metallic rollers about two feet long, and six inches in diameter, are to be turned perfectly true, and polished; the upper of these rollers is to be borne down on the under one by weighted levers. The paper to be pressed is carried to the rollers by a feeding table, which is an endless apron; upon this it is held by four small rollers which are made to revolve with a speed somewhat less than that of the pressing rollers, for the purpose of holding it, and causing it to pass through smoothly. The paper pressed is received upon a second endless apron, and deposited by it in a box, or trough. Either hot or cold pressing may be performed by this machine.

The patentees state that such a press is now in use at the Falls Creek paper mill, Ithaca, which presses from twenty to thirty reams per day. That the quality of the paper is improved, and much labour saved.

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9. For a *Machine for Raising Water;* Philip Tusing, Brooks' Gap, Rockingham county, Virginia, November 7.

In examining the *inventions* which are patented we are perpetually called upon to employ the degrees of comparison, and are enabled frequently to say *good*, sometimes *better*, but not knowing what may hereafter come, we never dare venture upon the term *best;* when, however, we come to the descending degrees, *bad*, *worse*, *worst*, the task is usually more easy, as, although it is no gratifying part of our duty, we are compelled, unhesitatingly, to place many patented contrivances in the latter class. The affair before us must, for a short time at least, stand at the foot of this list; it is not improbable, however, that by to-morrow it may stand go up one.

The machine for raising water here patented, consists of an overshot wheel, the shaft of which is to give motion to an endless chain of buckets, and these are to deliver the water from a reservoir below, into one above the wheel; this water is to keep the wheel in motion, and, of course, to perform some other labour. Should it be employed to work a guillotine, and the first culprit condemned to lose his head

by its agency be permitted to live until the axe is raised by the power applied, we are ready to insure him immortality.

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10. For an improvement in the *Turning Lathe;* John Bisbee, Plainfield, Hampshire county, Massachusetts, November 8.

The lathe here described is intended for turning sticks, used for broom handles, or other purposes, either straight or tapering, and with such ornamental beads, or mouldings, as may be required.

A sliding cat-head, of cast iron, has a hole through it, of such size as just to admit the stick when it has been rounded by a gouge fixed for the purpose. A lever attached to, and working on, a pin in the cat-head, carries a second gouge and a smoothing chisel, the gouge cutting the stick to the size required, and the smoother finishing it as it passes through the hole. There is a contrivance for allowing the cutters to advance for the purpose of making the stick taper, and what is called a buzz, for forming the ornamental parts. The particular construction of the mandril, and of the front centre, are described by the patentee, but those and the other parts relied on as new are not sufficiently well represented in the drawings to give an exact idea of them, so as to enable a workman to make them without exercising his inventive powers. We again repeat the fact that it is of little consequence, in a legal point of view, that they may be understood from an examination of the model; this, we have often said, makes no part of the patent, as it cannot be placed on file, or published for the information of the community.

The claims made are to the "giving the cat-head such a form that the second cutter, or gouge, and the smoother may be connected with it, and at the same time be raised or lowered by a rest; and placing the edges of the dies in such a position as to cut naturally and smoothly to any size wanted; also the turning buzz, however it may be applied; the hole and piece in the end of the centre pin; the sliding rest, and the moveable spindle, or mandril, with its ring edge, and edge across its centre."

Where claims are made, in this way, to the individual contrivances appended to an instrument so long and universally employed as the lathe, there is no small danger of following in the track of a preceding traveller. Cutters in sliding heads, sliding mandrils, buzzes, moveable centres, and most of the things above enumerated have been repeatedly and variously applied; we think, therefore, that the claim in a case like the foregoing, should be to the general arrangement and combination of the respective parts described, so as to produce the effect intended, and set forth in the description.

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11. For a machine for *Sawing Gun Stocks;* Abraham Myers, Boonsborough, Washington county, Maryland, November 9.

Saws are to be worked up and down in a frame, by the crank of a common saw mill; three saws are named, two of which are to be cut longitudinally, and the third to cross cut the ends of the stocks. The plank is to be laid upon a platform, and bellows are to be moved by the machinery, in order to blow away the saw dust. The platform

upon which the plank is laid, is particularly claimed; as also are the bellows for blowing away the saw dust, and the general arrangement of the whole. If there is any thing new in the whole of this contrivance, it is the windy part alone. In numerous machines saws are worked precisely as these are, and, we apprehend, always with a platform upon which to lay the plank to be sawn, as it would be difficult, if not impossible, to give it a firm aerial foundation.

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12. For an improvement in the *Art of Distilling* Spirits from Grain; Lewis Johnson, November 9.

The usual method of making a mash of rye meal, malt, hop water, and yeast, is detailed by the patentee, who states that it is followed by him, but that he has an improvement, which consists in an addition of ardent spirits, generally of rye whiskey, at the time the yeast is put in; the quantity of spirits being from half a gallon to three quarts, for every 100 lbs. of meal. The effect produced by this addition, is said to be, that the *stalk yeast* is rendered more powerful in *working off the chop or grain mash* into alcohol, or spirits, and the obtaining of from one to two quarts more of spirits from every 60 lbs. of *chop*. It is said also to prevent the souring by standing, which sometimes takes place.

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13. For a *Machine for Planking Hats;* George and Edwin Page, Manchester, Hartford county, Connecticut, November 9.

A wheel, or drum, five or six feet in diameter, the periphery of which is formed of plank, is hung by its axis on a suitable frame. The whole is to be covered with cloth. A semicircular segment, made of plank, is placed under the lower side of this wheel, and comes at each end nearly up to its centre, and is borne up against it by weighted levers; this is called the planking apron, and between it and the revolving drum the bodies to be planked are rolled, by the turning of the wheel. One face of the wheel, near its periphery, is surrounded by cogs; an iron shaft crossing the wheel from side to side carries two segment pinions, one of which has seven and the other three teeth on it; these taking into the cogs on the opposite sides of the wheel turn it in reversed directions, the one with seven carrying it forward, and the one with three backward, thus rolling the bodies backward and forward as they pass between the planking apron and the wheel. A kettle made in a form which adapts it to the wheel and apron, receives them at their lower sides. A planking board is fixed at that end of the apron where the machine is fed by the workmen.

There is no claim made, the whole machine, we suppose, being considered as new.

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14. For *Rail-road Cars, to run on Curves;* Samuel Snyder, Lancaster, Pennsylvania, November 10.

A piece of scantling passing along under the centre of the car, forms a perch, on the middle of which a hinge, or rule joint is form-

ed, but in one of the pieces the hole to receive the pin is to be lengthened to form a slot, or mortice, admitting of the lengthening of the perch to a certain extent. The axles for the wheels are to be fastened to the perch by their middles, and this contrivance is to admit of the car passing on curved roads. In this there is nothing new in principle, and, we are well convinced, nothing good in practice. The patentee proposes to adopt the common lock bar of wagons as a brake to come in contact with the wheels when the horse holds back; this, we suppose, is to aid him when descending on inclined planes. The whole affair does not appear likely to come into very extensive use.

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15. For a *Rotary Steam Engine;* William Jones, Bradford, Orange county, Vermont, November 10.

This rotary engine looks as promising as most of the members of the same family, but like many other promising children, it will in its course disappoint the anticipations of its parents. Upon this point we may speak with undoubting confidence, because there is nothing new either in the principle upon which it operates, or in the arrangement of its individual parts, excepting we admit a mere change of shape to be a new arrangement. One cylinder revolves concentrically within another, there being sliding valves, borne out by springs, which fill the chamber between the two cylinders, and retreat within the inner one by the action of a fixed stop, which forms an inclined plane attached to the inside of the outer cylinder. An induction and eduction pipe admit and discharge the steam in the usual way. The claim is to "the before described rotary engine."

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16. For a *Corn Sheller;* Daniel Hall, Strasburg, Lancaster county, Pennsylvania, November 12.

A cast iron cylinder, twenty inches long and seven in diameter, is covered with teeth, formed like saw teeth, which are to shell the corn. There is so little difference in the action of this and some of the earlier machines for the same purpose, that we do not think it necessary to say much about it; particularly as there is no claim made, and the drawing itself is not descriptive, and has no written references, as required by law.

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17. For *Wheels and Axles of Locomotive Engines, and Rails adapted to them;* Richard Berrian, city of New York, November 13.

The principal thing here proposed, is to have cog wheels attached to each of the common wheels, to take into rack rails, on the outside of the ordinary rails; or, otherwise, to have one cog wheel on the middle of each axle, with a rack rail laid for it to work in, to enable the engine and cars to ascend and descend on inclined planes. Those who have made themselves acquainted with what has been proposed and done in this business, need not be told that there is nothing new in the plan, and, as it contains nothing more, it would be a mere waste of time to dwell longer upon it. Had the patents for improvements

in rail-roads and cars been obtained by practical men only, they would have been few in number, and it is not probable that the very same thing would have been the subject of numerous patents, as is now the case.

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18. For an Accelerator, *being an improved mode of applying Horse Power;* Richard S. Schevenell, Orangeburgh district, South Carolina, November 13.

The apparatus which is here patented, is to be applied to the common horse mill, in which the animal walks in a circle. A post is put into the ground at the centre of the horse walk, and from this rises a bolt or pin upon which the lever to which the horse is geared drops, and round which it revolves as a dead centre. The outer end of the lever is sustained by a wheel, or wheels, which run upon a circular rail-way, supporting the lever in a horizontal position. The vertical shaft has a gudgeon on its lower end, the step of which is on the upper end of the bolt, or pin, which receives the horizontal lever. This shaft, therefore, is completely detached from the lever, and would remain at rest whilst the horse walked round were it not for certain wheel work by which the lever is geared to it. Of this gearing machinery it is unnecessary to give a particular description; suffice it therefore to say that at the lower end of the shaft there is a pinion driven by wheels which cause the shaft to revolve several times whilst the horse goes round once. According to the patentee, "the advantage in this machine is, that I obtain two-thirds of the horse lever, whereas, in the machines generally, only one-third of the lever is obtained. The economy of animal power, with the great velocity of which it is susceptible, will, I am sanguine, render this machine peculiarly applicable for every species of mill."

We have had occasion to describe the gearing of some horse mills, intended to give an accelerated motion, but they have differed from the present in operating at the upper instead of the lower end of the shaft; in one thing, however, they agree together, namely, in violating the universal principle in mechanics, that what is gained in power is lost in time, or rather, conversely, what is gained in speed, (time,) is lost in power; a rule which applies to the bottom as well as to the top of a vertical mill shaft. This being the case, we are not "sanguine."

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19. For a *Binnacle Lamp;* William Lawrence, Meriden, New Haven county, Connecticut, November 14.

The body of this lamp, in which the oil is to be contained, is made in the manner of that of the astral lamps, with two shells, which when united form a ring-like reservoir. The outside of the lamp is to be six inches in diameter, and the opening in the middle two inches. Tubes for the wicks are to rise from the upper edge, and project over the opening, so as to throw a light down upon the compass. The inner shell is to be brightly polished, that it may serve as a reflector.

The lamp is to be hung by gimbals, in the manner of the common compass.

The claim is to "the peculiar construction of the lamp as above described, and the *application* to it of the common and well known principle of suspending the mariner's compass, as specified above, whereby the horizontal position of the lamp, and the diffusion of light down upon the compass, will be preserved, notwithstanding the rolling of the vessel."

On the 23d March, 1831, Mr. Lawrence obtained a patent for a hanging lamp, constructed as above, an account of which, with a sketch, will be found in vol. viii. p. 18. He cannot now, therefore, make a valid claim to the peculiar construction of this lamp, for he would, in that case, have two patents for the same thing. The hanging of lamps on gimbals is also old, and we do not think that there is enough of novelty in the arrangement and application to sustain a patent; if, in fact, his old patent was good, no one could take his lamp, place it on gimbals, in a binnacle, and thereby make it his own.

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20. For *Circular Elliptical, or Conic Stair Carriages;* Edward B. Smith, Buffaloe, Erie county, New York, November 15.

A mode of marking out and finishing the work in the construction of curved stairs, is given in this specification; it would require more space to explain the proposed procedure than would be acceptable to any but carpenters, and we probably should not render it clear even to them. We think the mode described is, in some respects, an improvement upon that generally followed; as a subject for a patent, however, we do not belive that it will be very profitable. A mere mode of executing work cannot, like a tool, or other machine, be sent over the country, where it may be required, and we apprehend that but few master carpenters, residing in distant places, will write to Buffaloe, and send the money for a right to use the patentee's plan. Sometimes, however, such things are worth patenting for the sake of the employment which it may secure to the individual workman.

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21. For an improvement in *Marine Rail-ways;* Leonard White, Norfolk, Norfolk county, Virginia, November 15.

This marine rail-way resembles so closely some of those previously patented, that after looking over the plan, without perceiving anything in it which we thought original, we turned to the claim at the end of the specification to ascertain from that, the points of difference between this rail-way and its predecessors, but met there nothing more than the words, "What I claim as my invention, and desire to be secured by letters patent, is the before described marine rail-way."

To sustain such a claim, the whole arrangement ought to be new; instead of which, we are inclined to think that the whole, or nearly the whole, of "the before described marine rail-way," is old.

Upon the ribs, or ways, of the inclined plane, a carriage is to ascend by the aid of rollers which extend from side to side of the carriage, and rest upon the ribs. Palls fall into racks on the side of the

inclined plane, and a proper cradle is made to support the vessel, &c. &c. Those acquainted with the subject will perceive that the foregoing parts are such as are common to similar structures, and, as no individual points of difference are designated, there is no evidence of their existence, and if they do exist, they make no part of the patent, not being noticed and claimed.

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22. For machinery for *Hulling and Polishing Rice,* Barley, &c. &c.; Theodore F. Strong, and Marcus T. Moody, Northampton, Massachusetts, November 17.

The seeds are to be first passed between mill stones, the runner being raised so as merely to crush the hull, then after being winnowed they are to pass through the machine for which the present patent is obtained. This machine consists of a truncated cone on a vertical shaft, working within a hollow truncated cone. The edge of the truncated cone, and the interior of the hollow cone are to be covered with cards, or wire points, in such a way that they shall be elastic. In passing between these, the hulling is to be completely effected. When required to be more perfectly polished, the grain is to be passed again through a similar machine, furnished with dog-fish skin, bristles, or other suitable substance. The claim is to the machinery made as above described.

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23. For manufacturing *Fenders for Fireplaces;* Thomas Thomas, and Robert Fuller, city of New York, November 19.

The mouldings required to give the pattern to the fender, are to be formed by circular dies, or rollers, between which the sheet metal is to be passed. An iron frame is made to sustain the rollers, which are fixed upon two shafts geared together by cog wheels of equal size. The moulding rollers stand out from the face of one of the standards, like a chuck on a collar and mandril lathe. The pressure of the rollers upon each other is regulated by screws, like those of a flatting mill.

These rollers are adapted to the forming of the moulding on the plate, whilst it remains straight lengthwise. In order to give the required curvature to the fender, that roller is to be removed which formed the face of the moulding, and another, closely resembling it, is to be substituted; this latter, however, differs from the former in being so made as to press upon, and stretch the projecting parts of the moulding, without affecting the body of the plate; this stretching causes the fender to be curved lengthwise, and that in proportion to the extent to which the operation is carried. In effecting this, a much heavier pressure must be exerted upon the rollers than was necessary in the first operation. As the moulding rollers are supported at one end only, we should apprehend some difficulty in this, and that it will be found necessary, in some instances, to run them between the standards, like those of flatting mills.

"The form of these rollers, and their application to the purpose above mentioned, and particularly the arrangement by which the cir-

cular form is given to the mouldings and edge, forms the novelty for which a patent is prayed."

There is certainly nothing new in the *form* of such rollers, as mouldings have frequently been raised on sheet metal by means of rollers, or revolving dies; it is therefore upon their adaptation to the particular purpose named that a claim to them must rest. We believe that the bending, by means of the secondary rollers, is new.

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24. For an improvement in the *Wool Carding Machine;* Luther Colburn, Fairfield, Franklin county, Vermont, November 20.

The improvement claimed consists in the manner of taking the wool from the card, and forming it into rolls. The wool is to be received from the doffing cylinder on to a smooth board, upon which it is to be rolled by means of an endless apron, the lower side of which is parallel to, and a little above, the board. The rollers which carry the endless apron are different in size; that near the doffing roller is of iron, and not more than an inch in diameter; the more distant one is of wood, and is to be three inches in diameter.

The patentee states that his plan is very superior to that commonly pursued, in which an iron crank, a steel comb, a roller of ten or fifteen inches diameter, a shoe or shell, and many other fixtures, are required, with which he dispenses. His apparatus, he avers, is considerably less expensive, works without noise, and is much less liable to get out of order. The claims made are to the individual parts of the apparatus, as, for example, "The iron roller or shaft; the wood shaft or roller; the apron; the board, with all the apurtenances thereunto belonging." It would have been better, we think, to have depended upon the general arrangement of the machinery for producing the effect in the manner described.

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25. For *Securing Frame Buildings from the effects of Heat, Frost, or Moisture*, from without; Ebenezer Mix, Batavia, Genesee county, New York, November 22.

Between the weather-boarding and the interior plastering there is to be an intermediate division of lath and plaster, which is to be placed there after the weather-boarding has been finished, and previous to lathing for the interior of the rooms. The air imprisoned between the two fastenings, being a bad conductor of heat, will, it is said, produce the desired effect.

There would, no doubt, be much advantage derived from this procedure, but, at the same time, there would be a considerable increase in the cost of building; an increase which would, in most situations, render a frame building nearly as expensive as one of brick.

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26. For a *Machine for Washing Gold and other Ores;* William Davis, late of Great Britain, but now of Faquier county, Virginia, he having declared his intention to become a citizen of the United States, November 22.

(See specification.)

27. For a *Washing Machine;* Eli Nichols, Union, Belmont county, Ohio, November 24.

In all its essential parts this new washing machine is rather old. A round tub is to be fixed upon a vertical shaft, placed under its centre, in such a way as to enable the tub to revolve readily therewith. A fluted cylinder, or rather a truncated cone, turned by a crank, has its periphery resting on the bottom of the tub, its gudgeons being sustained by the frame work. When this is turned, the tub also revolves, and any clothes contained in it will pass under the fluted roller. A hoop, or some similar contrivance, surrounding the centre, and resting on the bottom of the tub, converts it into a circular trough, and keeps the clothes to be washed under the roller. The gudgeons of the roller run in slots, admitting it to rise and fall, according to the thickness of the clothes beneath it.

We recollect two patents, at least, for a similar affair; the present patentee, however, appears to consider the whole as new, he not having made any claim whatever.

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28. For a *Gum Elastic Bathing Cot;* Walter C. Palmer, city of New York, November 24.

A bathing trough is to be formed by using gum elastic cloth, or other water proof material, which is to be suspended to a frame like that of a cot. The patentee claims "the application of cloth, or other flexible material, rendered impervious to water, by any means, to the purpose of bathing, by attaching the same to a frame in such manner as to give it the form and capacity necessary for a bath."

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29. For an improvement in *Clocks;* James S. Seger, city of New York, November 27.

This improved clock is not destined to take the place of chronometers, or of time keepers made for astronomical purposes; we believe, however, that it possesses novelty, and, compared with clocks in general, it has great simplicity. A piece of board six inches square forms the foundation of the clock; and this it is proposed to hang upon a nail in a wall, by a ring placed at one of its angles. Into the centre of this board a round steel pin is driven, which receives the pipe or barrel of a fling wheel, the diameter of which is nearly equal to that of the board. Just above the teeth of the fling wheel another piece of steel is driven, which forms a knife edge suspension for the pendulum. This latter is a long bar, say of two feet, weighted at each end, and hung in a horizontal position upon the knife edge like a scale beam; a part of the pendulum on each side of the point of suspension extends downwards so as to form pallets, acting upon the teeth of the fling wheel, and thus constituting the escapement.

The face upon which the hours and minutes are marked is a flat circular rim, which is merely hung upon the pipe of the swing wheel, and is furnished with teeth, or notches, which must, we suppose, fall into corresponding teeth on the outside of the pipe, although we are not so informed in the specification. A second, but smaller circular

rim is also hung upon the same pipe, and has a projecting part upon it which constitutes the hour hand. The size of the openings, and the number of notches on these suspended rims must be so calculated as to correspond with the other parts of the machinery. A weight acting upon the pipe, or barrel, of the fling wheel, is the maintaining power. A fixed wire extending from the centre pin to the knife edge, serves the purpose of a minute hand, as the suspended rim revolves beneath it.

The claims are to "the operation of the escapement wheel, revolving on a pin or pivot, instead of being made fast to, and being solid with a pinion, as in the usual way. The whole and entire operation of the circular rims, or faces, or dials, for the purpose of ascertaining the time. The application of the pallets and pendulum in one solid piece, or combining them both in one."

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30. For an improvement in *Saw Mills;* David W. Hall, Sparta, Hancock county, Georgia, November 27.

"The invention here claimed consists in the regulating screws, nuts and blocks by which the saws are kept at a proper distance apart; the bar, hooks, and screw-bolts for tightening the saws; the screw-rods, nuts, and blocks, passing through the fender posts, and placed above the log to be cut, for stiffening the saws without making the saw gate so heavy as is common in order to accomplish this object;—and the cylindrical rods placed on the fender posts, with the small metallic slides on the saw gate by which the friction is reduced."

The foregoing claim will point out, pretty clearly, to those well acquainted with saw mills, the general arrangement adopted by the patentee, and will show that it embraces very little of novelty in either of its parts. Guides for stiffening the saws have often been placed just above the log, and made adjustable, to adapt them to stuff of different sizes. The frames have also been made to work in metallic guides, instead of against the fender posts, and, in fine, nearly all the ends proposed in the present patent have been obtained by analogous means.

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31. For an improvement in the *Construction of Mill Stones;* John Marley, city of New York, November 28.

The bed stone and runner are to be made of burr stones, but in a six foot stone, the centre of the bed stone, for a diameter of four feet, is occupied by a wheel of cast iron; the grinding part of the stone forming a rim around this, of only one foot in width. The runner is constructed in a similar manner, with a large opening in its centre, but the rim is only eleven inches in width, so that when placed upon the bed stone an annulus of the latter, an inch in width, is left uncovered by it. The grain from the hopper falls upon a conical cap which guides it on to this inch ring of lower stone, where the feeding takes place. Instead of one there are four or more spouts for the delivery of the flour.

"The advantages of said stones over the mill stones now in use,

are, *first*, they are less liable to heat the flour; *secondly*, a greater quantity may be ground in a given time and with less power.

"All I claim as my invention is the peculiar form and construction of said mill stones."

32. For an improvement in *Fanning Mills for Cleaning Grain;* David Clinton, North Haven, New Haven county, Connecticut, November 29.

The general form of this wheat fan is the same as that most usually employed; the patentee, however, has extended his description over half a dozen pages, of which we shall give no more than the claims, which are to "the peculiar form and construction of the hopper, and of the cog and pinion wheels connected with the shaft of the fan; and also the lower shake and its appendages; the peculiar gearing to produce the double shake; the locker for the safe deposite of the sieves and grate when not in use." The said deposite for the sieves and grate is merely a box fastened on to one side of the machine.

33. For a machine for *Cutting Sausage Meat;* Charles Otis, Greene, Franklin county, Pennsylvania, November 29.

A row of levers vibrate upon a rod, or bolt, which passes through the whole of them; these levers have knives on one end, with which the cutting is to be effected; under the other ends of them there are springs which are intended to force the knives down with a smart stroke. The levers are to be raised by means of cams, or lifters, placed upon a revolving cylinder. The claim is to "a machine constructed upon the principles, and operating in the manner described; that is, with levers, or helves, each carrying a knife, and operated upon by cams, or lifters, upon a revolving shaft.

34. For a *Method of Heating Carriages,* and all travelling vehicles; Alexander M'Williams, M. D., Washington, District of Columbia, November 29.

The specification of this patent is altogether inadequate as a specification, seeing that it does little more than inform us what is to be done, leaving every one to invent his own method of carrying it into operation. We are told that the carriage is to be provided with flat metallic boxes, or tubes, fitted to any part within it, and that these are to be heated either by lamps, coal, wood, spirits, or other combustible; that the flame and smoke are to ascend into these boxes, from the lamps, or other articles in combustion, tubes being provided to carry the smoke off. The burning body is to be fixed somewhere on the outside. The claim is to "the *method* of heating carriages from the outside, with a lamp, or lamps, wood, coal, spirits, or any other combustible matter; and heating thereby from the bottom, top, sides, or ends, by double or single metallic boxes, or tubes, placed on the bottom, top, sides, or ends, of the carriage, connected or separate."

A specification so vaguely drawn up, does not certainly fulfil the

requirements of the law, that "in the case of any machine, he shall fully explain the principle, and several modes in which he has contemplated the application of that principle."

In the Transactions of the Society for the Encouragement of the Useful Arts, established in Paris, there is a description of a similar contrivance, of which we intend to give an abstract, in the succeeding number of this journal.

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35. For an improvement in the *Tanning of Leather;* Joseph Blunt, city of New York, November 30.

Although the specification of this patent describes a particular apparatus by which a vacuum is to be produced in a vat for tanning leather, it is not accompanied by any drawing. The patentee says that his "improvement consists in producing a vacuum in a vat in the manner above described, and the letting in the tannin, to tan the hides, while the air is thus exhausted."

The leather is put into the vat, filled with water, which is then to be so closed up as to be air tight. A pipe, or tube, descends from the bottom of the vat, the lower end of which is to dip into a vessel of water. The tube is to be thirty-two, or more, feet in length, and is to have a valve or stopcock at the bottom. A vacuum is to be produced in the vat by opening the valve at bottom, which is to permit the water to descend from the vat, through the tube, until it is counterpoised by the pressure of the atmosphere. The vacuum being thus produced in the vat, the communication between it and the tube is to be cut off, by closing a valve at its upper end, tanning liquor is then to be passed into it through a tube prepared for the purpose. "When additional pressure is required, it may be given by a force pump, or hydrostatically, by a column of the tanning liquor."

In order to carry the proposed plan into operation, it will, in general, be necessary to place the vat at the top of a high building, so that its bottom may be elevated thirty-two or more, feet above the point where the water must be discharged; this, we think, a very objectionable part of the plan, especially as the end can be attained, very readily, by the application of adequate and well known means. At p. 418 of vol. x. an extract from "Babbages Economy of Machinery," will be found, showing that the principle of tanning in a vat exhausted of air is practically applied in England. The patentee, it is presumed, was fully aware of this circumstance, as he has not claimed the mode of tanning in a vat exhausted of its air, but merely his own mode of exhausting it; a mode the adoption of which we apprehend will not be recommended by any superior convenience.

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36. For an improvement in the *Art of Turning;* Horatio Cook, city of New York, an alien, who has resided two years in the United States, November 30.

The object patented is the making the top rail and slats of chains, by turning, instead of working them by hand, out of wood sawed to the curve, or bending them out of straight stuff. The patentee says that

he turns six tops at once, by taking stuff sawed to the proper curve, and fixing them, by glue, or otherwise, so as to form a circle on the face of a wheel. The length of a top, he observes, is commonly eighteeen inches, that their curvature is a radius of three feet, and that consequently six of them will make up the circle. The term radius, we suppose, is here used instead of diameter.

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37. For an improvement in the mode of *Setting Glazier's Diamonds;* John Dickenson, city of Philadelphia, November 30.
(The specification will appear in the next number.)

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for an improvement in the Saw Mill, by the application of which circular saws are made to cut laths, or other light work, on the edge, and on the side, at one operation. Granted to FRANCIS SHUMARD, *Cincinnati, Ohio, October* 31, 1832.

The log to be sawed into laths, or other strips, is first cut to the required length, and then fixed upon a saw carriage, with suitable head blocks. This carriage may be made to traverse backward and forward by any appropriate gearing; that which I commonly use, and which I prefer to any other, is the crank motion communicated from a revolving shaft by means of a pitman.

The two shafts of the circular saws run in a frame which is made to slide up and down between vertical cheeks above the log. By means of a lever, a rack and pinion, or other contrivance, the frame may be raised or lowered so as to adapt the saws to the dimensions of the log. I usually employ one saw running horizontally, and two, or more, running vertically, which latter cuts the laths, or other strips, to a proper thickness, whilst the former cuts them off at their edges.

The saws are made to cut as the log passes in either direction, thereby saving the time which would otherwise be expended in drawing the log back.

For the purpose of setting, or of moving, the log sideways, the carriage is divided into two parts, one of which runs upon suitable rails on the other. An iron shaft under the upper section of the carriage, has a pinion upon each of its ends, which operate upon racks on its lower side. A rag wheel on the head of the shaft, provided with palls, and acted on by a feed hand in the usual way, shifts the log sideways, to such a distance as shall correspond with the thickness of the laths to be cut.

At each end of the frame on which the carriage moves, there are attached blocks, or trippers, against which, at every semirevolution of the crank, the hands strike, and are lifted so as to act upon the rag wheel in the requisite degree.

By means of the drawing deposited in the patent office, and the references thereto annexed, the various parts which I have described, and their mode of action, will be readily understood.

What I claim as my own invention, and for which I ask a patent, is the causing of the saws to cut as the log traverses in either direction; the mode of moving the log sideways, as above described; the combined use of vertical and horizontal saws, cutting the sides and edges of the lath simultaneously; the mode of adjusting the saws by means of the sliding frame; and the general construction and arrangement of the apparatus by which the intended effect is produced.

Francis Shumard.

Specification of a patent for an improvement in the Reacting Water Wheel. Granted to Robert Eastman, *Concord, Merrimack county, New Hampshire, March,* 1833.

WITH TWO COPPERPLATES.

To all whom it may concern, be it known, that I, Robert Eastman, of Concord, in the county of Merrimack, and state of New Hampshire, have invented certain improvements in the construction of the reacting water wheel, used for the driving of machinery by the reaction of water, by which improvements its action is rendered more perfect, and it is rendered self-regulating by the addition of a regulator, or governor; it is also made peculiarly compact, whilst it still affords sufficient inlet and outlet for the water to operate in the most effectual manner. And I do hereby declare, that the following is a full and exact description of my said improvements, reference being had to the drawings which accompany, and make part of, this specification.

The wheel may be made in whole, or in part, of cast iron, or other materials may be employed in its construction. It may be cast in pieces like those represented in the drawings, or the form may be variously modified, whilst the same principles are retained. Its dimensions may also be changed, and when of a very small size, the number of floats may be reduced to fewer than eight, which is the number I generally employ, as shown in the drawings. A is the shaft of the wheel, terminating below at the step on the bridge-tree O, which is capable of being raised or lowered by means of a suitable rod, or rods, as shown at S. When eight floats are used, four of them are stationary, and four are moveable, and it is by means of the latter that the quantity of water to be expended is regulated. D represents the top rim of the wheel, which has a projecting fillet, *d*, cast on it, which is made to fit exactly in the opening of the cistern piece or plate, C. A similar rim is made for the under side of the wheel, but, on this, I usually place the fillet on the outer edge. These rims are to be attached to the stationary floats by means of screws,

or rivets. On the flooring piece C, the stationary floats, which may be cast in one piece with it, are shown by black lines, whilst the dotted lines represent the moveable floats, alternating with the former, and by their motion enlarging or diminishing the aperture at each of their ends. They are supported by bolts passing through them edgewise, and through the upper and lower rims. The plate F, having upon it the jointed arms, or connecting rods *a*, *a*, *a*, *a*, is intended to act on the moveable floats, in doing which it receives its motion from a regulator, or governor, to be presently described. A side and edge view of one of the moveable floats is given at E E, with the slot which admits of its being drawn by the connecting rods nearer to the shaft A. C C are cistern plates, which rest upon ledges *c*, *c*, *c*, *c*. These ledges are also shown in the section R. B is a centre-piece, which I employ to connect the wheel to the shaft. T T are the bolts which connect and support the cistern pieces.

The regulator, or governor, acts upon the same principle with those used for steam engines and other machinery, and is only so modified as to adapt it to the purpose to which I apply it. U U are the centrifugal balls, the jointed arms, N, of which act upon the sliding collar L. There are two wheels, M M, which I call the upper and lower blank wheels. In the upper blank wheel the collar L turns freely, whilst it is so connected with it by means of a ring and set screw, as to cause the two to raise and lower together. The two blank wheels are connected by the two bolts *n n*, and two pins rising from the plank V, and passing through the ears *e e*, serve to guide them steadily. The axis of the vertical blank wheel P, passes through the shaft A, and has, on each side of the shaft, an endless screw, K. These endless screws take into wheels H H, placed upon the rods I I, for the purpose of causing them to revolve. When the centrifugal force is much increased, the regulator will bring the lower wheel, M, into contact with P, and when sufficiently decreased, will bring the upper wheel, M, in contact with it, when the wheels H will be turned, and the pinions J J, on the lower ends of the rods I I, taking into the teeth in the openings in the plate F, and causing it to turn, will open or close the moveable floats. At a medium speed, neither of the wheels M M will be in contact with P.

The regulator may, if preferred, be detached from the shaft, and carried by a band or otherwise, and be geared so as to operate on the rods I I; it may also be dispensed with entirely, and the wheel P, or some appendage operating in the same way, may be turned by hand, so as to set the floats in any required position.

The cistern pieces C C, I prefer to make of wood, as they produce less friction than iron, when accidentally brought into too close contact with the wheel; and they are also, when worn, more readily and economically adjusted than if made of metal. As the water is admitted both above and below the wheel, its pressure is equalised, so that the weight of the column is not felt on the step. The two orifices likewise tend to give a full and equable supply of water to the wheel.

What I claim as my invention, and for which I ask a patent, is the making the floats of a reaction wheel adjustible, as herein described.

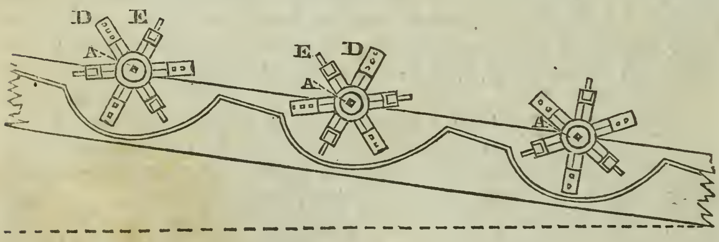
I also claim the application of the regulator or governor, to render them self adjusting. Likewise the manner of adjusting them by hand, enabling the operator to do so without the necessity of descending to the wheel, or in any way disturbing the arrangement of the apparatus. In effecting these objects, I do not intend to confine myself to the precise mode which is herein set forth, but to adopt any other which operates upon the same principle, and produces a similar result.

ROBERT EASTMAN.

Specification of a patent for a machine for washing Gold and other Ores. Granted to WILLIAM DAVIS, *late of Great Britain, but now of Faquier county, Virginia; he having declared his intention to become a citizen of the United States. November* 22, 1832.*

To all whom it may concern, be it known, that I, William Davis, have invented a machine for washing gold and other ores, and that the following is a full and exact description thereof.

I make any number of revolving reels, so formed as to carry dashers, or agitators, and rakes, which are to operate upon the ore or other matter containing metal; these reels revolve in a succession of curvelinear troughs, or concaves, constructed upon the principle exemplified in the annexed drawing.



A A A are the shafts of the revolving cylinders, or reels, carried round by means of bands working upon whirls, or by bevel gearing, or in any of the ways in which such motion is ordinarily communicated. The said reels are provided with any number of sets of arms, to carry the dashers, and rakes; most commonly, however, I employ six sets of arms, three of them furnished with dashers without rakes, and three with teeth, forming rakes. D D shows the longitudinal dashers without rakes, and E E the dashers with rakes. These cy-

* As we have not thought it necessary to give any more than a sectional drawing of the reels, or beaters, those parts of the specification which refer to drawings of the other parts, have been omitted.

linders may be made of any convenient length and diameter, but in a machine which I have found to answer well, they are four feet six inches long, and eighteen or twenty inches in diameter, from point to point of the rake teeth.

In giving motion to the reels, their velocities are graduated in such way as is found to produce the best effect, which will differ according to the nature of the ore; in all cases, however, the gearing is so managed that the upper, or first reel, has the greatest velocity, the velocities gradually diminishing until that of the lower is such as not to throw the finer particles of metal from the trough. The mechanical action of the reels is such as to deliver the earthy particles from one trough to the other, until they finally flow off at the lower end. In many instances I find it of advantage to supply all the dashers of the upper reel with teeth, forming them into rakes, as this serves the purpose of dividing, or comminuting, the material to be washed, which prepares it more perfectly for the action of the other reels.

Most commonly I employ three transverse reels only, and increase them to five, or such other number as may be found best adapted to the kind of ore, or other substance, to be operated upon. The whole machine forms an inclined plane, from the feeding to the lower end, as shown in the section.

The concaves, or hollow troughs, although curved, are not usually made segments of circles, or if so made, the circle is of considerably larger radius than the semidiameter of the rakes, as the points of these are to come nearly into contact with the bottom of the troughs, but enter and leave them at such a distance as shall allow for feeding, and prevent the improper dashing over of the material which is being operated upon.

A feeding board, or hopper, is used, from which the material to be washed may be supplied, and upon which the required water may be allowed to run; there is nothing peculiar, or novel, however, in this part of the apparatus, and, therefore, it does not require to be described; nor is it necessary to specify the frame work of the machinery, as every competent workman will be able to construct this, in such way as he may prefer.

What I claim as new, and for which I ask a patent, is the employment of a machine for washing gold and other ores, which machine has revolving reels, or cylinders, carrying dashers, a part of which are furnished with projecting pieces, or teeth, which come nearly into contact with the lower side of a trough, or concave, within which they revolve; whether the same be made in the exact manner herein described, or in any other operating upon the same principle, and producing a similar effect.

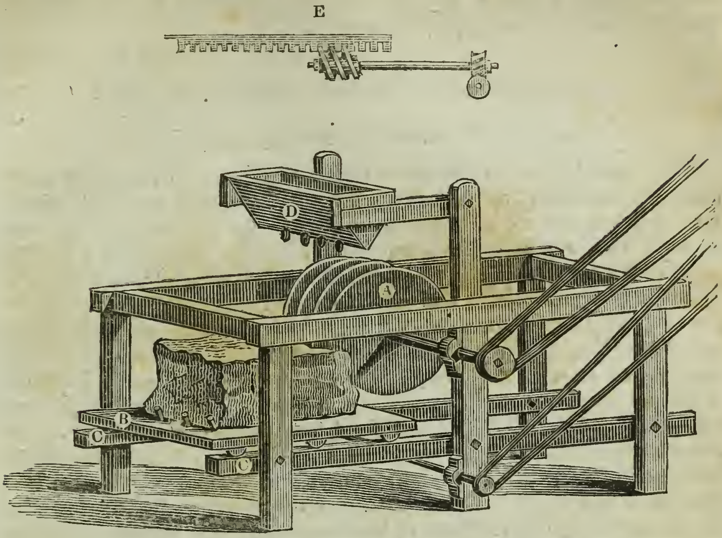
William Davis.

Specification of a patent for an improvement in the method of Sawing Marble, and other stone, and cutting or working mouldings, or groovings, thereon, and polishing the same. Granted to Isaac D. Kirk, *city of Philadelphia; first issued July* 3, 1832. *Patent surrendered, and reissued on an amended specification, December* 28, 1832.

To all to whom these presents shall come, be it known, that I, Isaac D. Kirk, of the city of Philadelphia, and state of Pennsylvania, have invented a new and useful improvement in the method of sawing marble and other stone, and cutting, or working, mouldings, or groovings, thereon, and polishing the same; the sawing being performed by means of an improved revolving, circular, metallic plate, smooth, or without teeth, upon the face, or edge, operating by friction with sand and water upon the material to be cut; and the moulding, or grooving, and polishing, being effected by means of the improved revolving moulding and polishing cylinder, or wheel, operating in cutting mouldings by friction with sand and water upon the surface to be wrought; and in polishing by friction, in like manner, with putty, buff, pumice-stone, or some other suitable material; viz. one or more circular metallic plates, smooth or not serrated upon the face, or cutting edge, (copper, or soft iron are deemed preferable,) are securely fixed, vertically, upon a horizontal shaft, or spindle, of iron, of any required dimensions, passing through the centre of the plate, or plates, and supported at each end by a proper frame of wood, or of cast iron, upon which the shaft works. On one end of the shaft is a cog wheel to connect it to the moving power.

Where two or more plates are used on the same shaft, they are secured at the proper distance from, and parallel to, each other, by circular metallic bands of a thickness adapted to the intended thickness of the slab, or slabs, to be cut; which bands are fitted upon and around the shaft between the plates, or saws. Under the shaft, at the distance of a little more than the radius of the plates, or saws, is a carriage on friction rollers, or wheels, resting on a permanent railway, to support and carry forward the stone, or marble, to the plates, or saws; it is moved either by a rack and pinion, or by weights and pulleys. Over the saws is fixed a hopper, filled with sand and water, which is carried by a conductor leading from an aperture in its bottom, to the saws at the point of their contact with the stone or marble. The plates, or saws, may be made of any required dimensions, and must be wrought to a uniform thickness throughout, with the cutting edge smooth, or not serrated, and either rounded, beveled or flat. The improved moulding and polishing cylinder, or wheel, is of any metal, (cast iron is preferable for moulding, and some of the softer metals, and wood, for polishing,) and of any requisite dimensions, having the converse of the intended moulding, or grooving, either cast or turned upon its surface, or periphery, by means of which any series of mouldings, or groovings, can be wrought on a

Kirk's machine for Sawing, Moulding, and Polishing Marble.



A. The saws, or the moulding cylinder of soft cast iron.
B. Carriage to support and carry forward the marble, or stone.
C C. Rails on which the carriage travels.
D. Hopper for sand and water.
E. Apparatus for advancing the carriage.

surface of marble, or stone, at one operation, and in like manner be polished. It is fixed upon a horizontal shaft passing through its axis, which is turned by a cog wheel connecting it to the power, and operates on the material to be wrought, by revolving vertically against its surface in contact with sand and water in cutting mouldings, and in contact with pumice-stone, buff, putty, or some other suitable material in polishing. A cylinder, having a regular smooth surface, is used in like manner for flatting, and for polishing a plain surface. The marble, or stone, is carried forward, and under the moulding and polishing cylinders by a mechanical arrangement similar to that before described.

The polishing cylinder is similar in form to the above, and used in like manner with polishing powder, as putty, buff, &c. instead of sand, and is made of wood, or some of the softer metals.

The improvement claimed by said Isaac D. Kirk, consists in the sawing of marble, or other stone, by means of a revolving, circular, metallic plate, smooth, or not serrated, on the face, or edge, and applied with sand and water, as is done with the straight saw; and also in making, or forming upon the surface, or periphery, of a metallic, or wooden cylinder, or wheel, the converse of the intended moulding, or grooving; by means of which, a series of mouldings, or grooves,

can be wrought on a surface of marble, or stone, at one operation, with sand and water. And in like manner, polished with putty, buff, pumice-stone, or other polishing material.

ISAAC D. KIRK.

Remarks by the Editor.

From the information which we have received relating to the above described machine, its invention appears likely to mark an important epoch in the art of working marble; this information has been derived from a gentleman of much intelligence, residing in Philadelphia, who relates only what he himself witnessed, as regards the operation of the machinery, and which we will give in his own words.

"I embrace," he says, "this opportunity of stating what I have seen of the practical operation of the experimental machinery erected here by the patentee; which, I will observe, was of very rude construction, and capable of great improvement in its application on a more extended scale. The saw used in these experiments was a circular copper plate of thirty-one inches in diameter, attached to a shaft working horizontally on a slight frame of wood, and turned by means of a band and whirl. I have seen this saw, worked by the power of *one man*, cut through a block of our hardest marble, one foot in length and depth, or one foot square, in thirty minutes; and with increased power I doubt not it might be done in much less time.

"I also, at the same time, saw the moulding wheel, of cast iron, work out mouldings on a slab of marble one foot in length, in one minute and a half, and have no doubt that the same could be done more rapidly with machinery less rudely constructed.

"The marble is left by the saw, as well as by the moulding wheel, or cylinder, in a state fit for polishing, without any preparatory chiselling, or rubbing down with sand; and the polishing is performed in the same manner as the moulding, and with equal or greater rapidity."

We are informed that in the sawing of large blocks of marble in the ordinary way, from six to eight square feet is accounted a good day's work; but that in the cutting of small blocks, a workman can rarely cut more than two or three feet. From the experiment above recited, it appears fair to conclude that ten times as much can be effected by Kirk's machinery, when operating on small blocks, and probably upon any which are not too large for the circular saw. This also, it may be observed, is not limited in its diameter by the same cause which limits those made of a single plate far sawing timber, namely, the expansion by heat, which causes the saw to buckle, an effect which will be prevented in the cutting of stone by the saw being kept constantly wet. The cost of a saw will be saved in the work performed by it in one or two days.

The letter from which we have quoted does not mention the width of the mouldings wrought by the revolving moulding wheel, but it appears likely that the saving of time in this usually slow operation, will much exceed that effected in sawing.

We perceive by the records of the patent office, that Mr. Kirk has assigned his right to Mr. Richard S. Risley, of Philadelphia.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

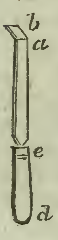
On the art of Glass Blowing. By Lafonde.

(Concluded from p. 259.)

To form a Lip.

3. To form a lip upon the end of a tube, or in other words to turn the edges over, it must first be cut and the edge rounded as already described in the two preceding operations; when it has been so far widened that the sides are bent outwards about forty degrees, the operation is completed by the aid of the instrument figured in the annexed cut, (fig. 5.) This instrument is made of a flat piece of iron, half an inch broad, six or seven inches long, and half a line thick; it has a handle *d e*; the bend *a b*, is about an inch and a half in length, and makes an angle of about ten degrees with *a e*. When the widened end of the tube has been softened, the instrument is applied to the rim, the part *a b* being placed at right angles to the axis of the tube. In order to this, it is held by the extended fingers of the right hand, the elbow being at a short distance from the body, in order to hold the tool more steadily; it is then passed over the edge, pressing it lightly as the tool is carried over it, until the desired effect is attained.

5



To taper a Tube at the end.

4. This is an important operation from its connexion with many others, the success of which depends on the skilful performance of this operation. The method of executing it is as follows:—take the tube in the left hand, as has been described in the process of edging, (paragraph 1.)

Hold the tube firmly in its position, in the right hand, the palm turned upwards, and the fore fingers close together, and raised almost perpendicularly so as to form a plane against which the thumb is applied, in order to turn the tube about its axis.

For the complete success of this operation, it is indispensable that both hands should exactly concur in the motion of the tube, so that this motion may be perfectly regular, and always in the same direction. When the tube becomes softened, if one of the ends were turned faster than the other, it would twist, would become obstructed, and thus cause the failure of the operation.

The tube, being held in the manner just mentioned, is placed in the flame of the large jet, and kept there until it is completly softened; it is then removed from the flame, and brought between the operator and the cap. The left hand remaining fixed, the right is removed

from it so as to produce a taper of about six or seven inches long. Care must be taken to continue turning the tube as if it were in the flame, to prevent its cracking or flying.

The principal merit of this operation consists in the taper being duly centered, that is, in its axis being identical with that of the tube.

Sealing, or Closing.

5. There are four forms which may be given to the sealed end of a tube.

1. *Conical sealing.*—This is produced by first tapering a tube at the place where it is to be thus sealed; the taper is next heated by the small jet, at a point the position of which depends upon the greater or less elongation of the required taper; the part to be separated is at the same time gently drawn off with the right hand until it separates.

2. *Spherical Sealing.*—After the tube is tapered, the taper is to be rendered more obtuse by heating the extremity; this produces at the tip a button of glass, which is heated in the small jet, turning the tube with the left hand, while in the right is held a capillary tube, the extremity of which is held in the flame.

As soon as the button begins to fuse, the heated end of the capillary tube is touched to it, and with a sudden slight jerk in the direction of the flame, the button is quickly taken off. The capillary tube being immediately struck lightly upon the table, the small lump of glass which adheres to it flies off, and the tube may be applied to detach a second button. This process is continued until the cone has been rendered so obtuse that the button at the extremity becomes imperceptible.

The tube is next to be transferred to the right hand, and the entire end heated in the large jet, the tube being turned between the fingers. When the sealed end becomes red hot, the operator blows gently into the open end, so as to form a ball upon the heated end.

3. *Flat sealing.*—This is formed from the spherical sealing just described, by heating in the large jet, and flattening the end gradually by the aid of the instrument, fig. 5.

4. *Indented sealing.*—This is formed from the preceding by heating the end of the tube red hot, and then exhausting by drawing in the breath, thus producing a re-entering cone.

To obstruct a Tube at any point.

6. This operation is performed by holding the tube in the flame, in the position described in the method of tapering, turning the tube until the bore is entirely closed.

To join a Pedicle.

7. A solid pedicle is obtained by tapering the obstructed portion of a tube of any convenient size.

In order to join the pedicle to the end of a tube, terminate the latter by a conical sealing: solder to the button at the extremity of the cone a drop of glass, to which unite the pedicle; the last two operations are performed with the smaller jet.

6

This pedicle may be formed into a hook of any desired shape, by the use of a small wire tool, (see fig. 6,) which may also be used to separate the wicks of the lamp.

To make a ring, the end of the pedicle is first fused in the slender jet, into a ball, to which a second pedicle is soldered, this being turned up by the tool, the end is joined to the tube at a point opposite to the juncture of the first pedicle. A finish is given to the two junctures, and the ring is complete.

Should it not have the desired shape, it must be heated in the large jet, and as it fuses, the diameter will lessen; the circular form may then be given to it by the hook.

To narrow the Bore of a Tube.

8. It is often necessary to diminish the bore of a tube in certain parts. There are two methods of doing this. In the first the tube to be narrowed is managed as described in number 6, the operation being stopped as soon as the diameter is sufficiently reduced; the external diameter tends to decrease as the internal diameter is lessened, the sides increasing in thickness; this must be prevented by gradually bringing the hands nearer to each other, the operator being guided by the effect produced.

The second method proceeds, at first, as just described; but instead of preventing the slight taper which results from the narrowing of the tube, it must be made more considerable by carrying the right hand a short distance from the left. When the tube is sufficiently narrowed the operation is reversed until no external contraction appears.

By this method, which is more difficult in practice, a more perfect contraction is obtained than by the former. The narrowing of the tube is more regular, the flare each way from the narrowest ring is more nearly conical, and more elongated, great advantages when a cone of cork or metal is to be fitted in the cavity to serve as a valve, as, for instance, in the pump which we shall hereafter describe.

To form a projecting Ring upon a Tube.

9. This operation, which is principally used for double joining, is performed by heating, in the slender jet, that part of the tube at which the projection is to be made. As soon as the glass softens it must be pressed together with both hands, turning the tube constantly; the sides are forced outwards, forming the projection, the planes and the sides of which ought to be perpendicular to the axis of the tube.

To succeed in this operation it is necessary to proceed slowly, and not to endeavour to obtain the desired effect, at one heating. Care should be taken that the two ends of the tube are kept in the same direction

To Pierce a Tube.

10. A tube may be pierced either in or out of the flame.

To pierce a tube in the flame, an operation only necessary when a small opening is required, the part to be pierced is held in the flame of the slender jet, so that it may play perpendicularly upon the tube. One of the ends of the tube being stopped, the breath is blown in at the other, and the tube is instantly pierced.

If a larger opening is required, the tube is placed as just stated, and when the point to be pierced is fused, the open extremity is brought to the mouth; the tube being then removed from the flame, the heated part swells out by the pressure of the breath; this cone is again exposed to the flame and is flattened until the flattened surface is somewhat less in diameter than the required opening; the impulse of the breath is then increased so as to make this part swell out into a ball, which if possible should not be suffered to burst. The thin part of the protuberance is cut off by a file, and the edging is finished in the large jet.

To Join Tubes.

11. We next proceed to treat of the various ways in which tubes are joined together, and of the modes of joining.

1. To solder together two tubes of equal diameter, the end of one of them, opposite to that which is to be soldered, is first stopped; the two ends, to be joined, are next widened by the process described in No. 2; they are then applied to each other and held in the large jet, turning them round all the while, that the whole circumference of their edges may be heated as equally as possible. After the two ends thus joined have remained for a moment in the flame, the operator blows through the open end, which should be placed on the right hand. This process of heating and blowing is repeated until the soldering is perfectly done, but care must be taken in blowing, that a very slight swelling is produced. When the joining is completed, this swelling is made use of to bring the tube to as uniform a diameter as practicable. To accomplish this, the operator exposes the most prominent parts to the flame, at the same time gently drawing the ends of the tube in opposite directions.

2. When a tube is to be joined perpendicularly to another, the tube is pierced according to the process No. 10, and having one of its ends stopped, is heated in the large jet, being held by the left hand a little above the flame, with the pierced aperture upwards and the open extremity towards the right, that it may be more conveni-

ently blown into. The tube which is to be joined to it, is held in the right hand, and turned between the fingers, perpendicularly over the point where they are to be joined.

After the tubes are sufficiently heated, the perpendicular tube is applied to the opening; the open end of the same tube is carried to the mouth to blow into it, the end of the horizontal tube opposite to point of juncture having previously been stopped. The vertices of the two right angles, formed by the soldering, are then alternately heated, and at each heating the operator blows gently into the tube. After the two angular points are perfectly joined, the soldering of the other parts may be effected in a similar manner.

The joinings are then annealed by removing them gradually from the flame.

3. It may happen that a tube is to be joined to another of a greater diameter, so that a portion of the smaller tube may be inserted in the larger. To effect this, the extent to which the small tube is to be introduced, being determined, a projection is formed on it, as directed in the process No. 9. The large tube is tapered at the two ends, which are closed by a conical sealing; this cone is rendered obtuse as already described, and an opening is made in the sealing by the method, given in No. 11, for piercing a tube. The aperture having been edged, the tube is introduced; the other end being closed, as already stated. The juncture is then applied to the large jet and finished as usual, by alternately heating and blowing into the tube.

In all the varieties of soldering, care must be taken that the points where the two tubes meet, project rather than form a groove, since in this latter case the joint would be more liable to break.

To Bend a Tube.

12. The most certain way to bend a tube properly, is to heat in succession the part intended to form the convex side, and that which is to form the concave side of the flexure. The other two sides are thus indirectly heated. All the portions of a proper flexure are perfectly uniform, without depressions on its convex, or wrinkles on its concave side; and all its corresponding points are contained in the same plane.

To attain these ends, if the tube is straight, it should be tapered at one end, and the tapered part be bent at right angles to the tube, and in the plane of the required flexure. The tube is then heated on the side which is to form the re-entering angle, and towards the bent end of the tube; a slight force is then exerted in the direction in which the flexure is to be made, and as soon as the heated portion begins to yield, the part next further from the bent end is heated, and so on until the flexure is completed.

To Blow a Bulb.

13. To blow a bulb, procure a tube of a thickness proportionate to

the size of the bulb required. Suppose the tube tapered at two points near to each other; two different cases may then occur; it may be required to blow a bulb at the extremity of one of the tapering parts, or between two of them.

In the first case the taper is changed into a conical sealing (No. 5,) and this latter into a spherical sealing. This being done, the whole tube is heated, turning it constantly between the fingers; when it is red hot, the open end of the tube is immediately applied to the mouth, and a bulb of the required size blown, the tube being still kept in rotation.

To blow a bulb between two tapers, stop one of the ends and heat the tube at the points where the bulb is to be blown, holding it in the position for tapering, described in No. 4. When sufficiently heated, withdraw it from the flame by a motion of the right hand, which is drawn near the body of the operator, and apply the lips to the open end of the tube without moving the left hand. The tube must be turned as long as the blowing is continued, that motion contributing to the regularity of the sphere, which should be so formed that the axes of the two portions of the tube may be the prolongation of the same diameter.

Every operation which is described as performed on the end of a taper, or between two tapered portions of a tube, may be also performed at the end of a tube, or at any point between the ends. To perform this, the large tube which is to produce the bulb, is joined on and tapered, the taper changed into a conical sealing, which is afterwards edged down.

Funnels.

14. To form a funnel, such as is at the top of a Welter's tube, first blow a bulb; holding this bulb in the right hand by the taper, expose it to the flame so that by the effect of the heat the part opposite to the taper may become flat, and form a plane surface at right angles to the axis of the tube. By now blowing strongly into the tube, the bulb swells out, and the thin sides of the protuberance are cut off by a file at about half an inch from the bulb itself. One end of a capillary tube held in the right hand, is then heated in the smaller jet, the left hand holding the bulb, already described, by the taper, and the remaining part of the protuberance is taken off by heating it in the slender jet, at a distance sufficient to form an edging. The capillary tube being in a state of fusion at the end, serves to remove the overplus glass which may be readily made to adhere, in consequence of its thinness.

To construct a funnel, such as is used in filtering, the conical form should be given to the bulb before it is burst, as far as may be practicable.

The operator heats it in parts, and makes the swell greater as the distance from the tube increases; after it has burst the cone is finish-

ed by the same process, and with the same instrument, as was used in widening.

Having now terminated the statement of the methods of construction of the parts most generally used in forming apparatus, we will proceed to point out the methods of making certain common articles.

Welter's Safety Tubes.

To make one of these tubes, cut from a tube any length, at pleasure, to form the first vertical branch. To the end of this branch join a portion of a larger tube tapered at two points; after which, cut off the taper on the end opposite to the joint, the use of which was to effect the juncture, and replace it by a spherical sealing.

Blow a bulb upon the portion of tube thus joined, (No. 13,) and make a funnel of the bulb, (No. 14.) A second portion of a large tube, similar to the first, is joined to the opposite end of the tube; then a short tube of the kind which forms the vertical branch just refered to is joined to the latter. The large tube is thus placed between two others of equal diameter; it is then blown into a bulb, as described in the second process of No. 13.

A horizontal tube, stopped at one end, is then pierced at the proper place, and the vertical tube is soldered to it, (No. 11,) the end terminated by the funnel having been, previously, stopped by a cork. The proper flexures are then made, beginning with the bending of the vertical tube.

Dropping Tubes.

To make a dropping tube, a large tube is soldered between two smaller ones. From the large tube is then blown a bulb, and one of the small tubes is tapered to the requisite thickness, after a lip has been made on the end of the other. The tube is then bent into a convenient form.

Whenever a permanent taper is formed, the sides of the tube should be allowed to thicken, thus rendering those of the taper stronger.

Capsule.

To experiment upon minute portions of matter, the chemist often requires small vessels, such as capsules, the methods of making which we now proceed to give. First, construct a funnel, and taper the end,

7

by means of the instrument represented at fig. 7, and which is composed of three small metallic rods fixed on a handle, the distance of the rods from each other being regulated by a sliding ring. Take hold of the funnel at the open side, and close the rods upon it by means of the slider; the button may thus be taken off completely, and the bottom of the capsule flattened by the use of the instrument, fig. 5.

If the capsule is properly formed, no trace of the button

should remain; the bottom should be quite flat, and the edges perfectly regular.

A bulb between two tapered portions of a tube, one of which is obstructed as already described, having been first heated on one side, then burst and edged like a funnel, will furnish a very convenient spoon for purposes of analysis. The obstructed part forms the handle, and the other, when suitably curved, serves as a beak, which is convenient in decanting.

We will conclude by describing the method of constructing a forcing pump with an air vessel.

Take a tube of about an inch in diameter and four inches in length, taper it at one end, edging it at the other, and join the tapered end to another tube three lines in diameter, and of any convenient length.

Pierce the large tube near the joining, and solder to it a tube three inches long, which has been carefully narrowed; bend the latter so that the part containing the contraction shall have its axis parallel to that of the former.

The body of the pump is thus finished: the air vessel is then constructed with a tube of the same diameter and length, within which is placed a smaller tube, soldered at the upper end, where it passes through the large tube. This soldering should be carefully executed, and the small tube kept exactly in the middle of the large one. This may be effected by edging the small tube and fixing it by temporary supports in the required place; after this operation is completed, three small pedicles of glass being substituted for the temporary supports, will keep the tube in place. The small tube is then tapered, leaving only a small aperture for the escape of water through it. On the lower end of the pump is fixed a valve, consisting of a cork cone greased with tallow, weighted with a bit of lead, and kept in its place by a brass wire.

In the contraction already spoken of, is placed another cone, which is prevented from moving too far by two cross threads, kept in their place by the cork which unites the air vessel to the body of the pump.

The piston is made as follows:—On a short tube of a convenient diameter, and tapered at two points, form two projections, about a line apart. Solder one of the tapering parts to a capillary tube, and remove the other. Between the two projections introduce a round piece of cork, having a hole to allow it to receive the tube which is between the projections. Slit the cork on one side, and after it has been placed divide it with a razor, or sharp knife, into two circular planes, which are moved round upon each other until the slits break joints with each other. The edges of the projections being ground so as to fit the body of the pump, and covered with grease, the apparatus is finished.

Notice regarding the Asphaltum or Pitch Lake of Trinidad. By Captain J. E. Alexander, *42nd Royal Highlanders, F. R. G. S. M. R. A. S., &c. Communicated by the Author.*

One of the greatest natural curiosities in this part of the world, is the lake of asphaltum or pitch in Trinidad, situated about thirty-six miles to the southward of Port of Spain. The western shore of the island, for about twenty miles, is quite flat, and richly wooded, and though only one or two houses are perceptible from the sea, the interior is well cultivated, and several small rivers, which empty themselves into the Gulf of Paria, afford great facilities for the transport of sugar to the ships which anchor off their embouchures. As Naparima is approached, and the singular mountain (at the foot of which San Fernandes is situated,) is plainly distinguished, then the shore assumes a more smiling aspect; here one sees a noble forest, there a sheet of bright green, points out a cane-field—cocoa nut and palm trees are sprinkled over the landscape, and gently wave their feathered foliage; now and then a well built house appears close to the water's edge, with a verdant lawn extending from it to the sea, and the ground sometimes broken into sinuosities, and then slightly undulating. The beauty of this part of Trinidad is very great, though, from some undrained swamp, poisonous malaria exhale.

At Point La Braye are seen masses of pitch, which look like black rocks among the foliage; they also advance into the sea. At the small hamlet of La Braye, a considerable extent of coast is covered with pitch, which runs a long way out to sea, and forms a bank under water. The pitch lake is situated on the side of a hill, eighty feet above the level of the sea, from which it is distant three quarters of a mile; a gradual ascent leads to it, which is covered with pitch in a hardened state, and trees and vegetation flourish upon it.

The road leading to the lake runs through a wood, and on emerging from it, the spectator stands on the borders of what at first glance appears to be a lake containing many wooded islets, but which, on a second examination, proves to be a sheet of asphaltum, intersected throughout by crevices three or four feet deep and full of water. The pitch at the sides of the lake is perfectly hard and cold, but as one walks towards the middle with the shoes off, in order to wade through the water, the heat gradually increases, the pitch becomes softer and softer, until at last it is seen boiling up in a liquid state, and the soles of the feet become offensively warm. The air is then strongly impregnated with bitumen and sulphur, and as one moves along, the impression of the feet remains on the surface of the pitch.

During the rainy season, it is possible to walk over the whole lake, nearly, but in the hot season a great part is not to be approached. Although several attempts have been made to ascertain the depth of the pitch, no bottom has ever been found. The lake is about a mile and a half in circumference; and not the least extraordinary circumstance is, that it should contain eight or ten small islands, on which trees are growing close to the boiling pitch.

In standing still for some time on the lake near the centre, the surface gradually sinks till it forms a great bowl, as it were; and when the shoulders are level with the general surface of the lake, it is high time to get out. Some time ago a ship of war landed casks to fill with the pitch, for the purpose of transporting it to England: the casks were rolled on the lake, and the men commenced filling, but a piratical looking craft appearing in the offing, the frigate and all hands went in chase; on returning to the lake, all the casks had sunk and disappeared.

The flow of pitch from the lake has been immense, the whole country round, except near the Bay of Grapo, (which is protected by a hill,) being covered with it; and it seems singular that no eruption has taken place within the memory of man, although the principle of motion still exists in the centre of the lake. The appearance of the pitch which has hardened, is as if the whole surface had boiled up into large bubbles, and then suddenly cooled; but where the asphaltum is still liquid, the surface is perfectly smooth.

Many experiments have been made, for the purpose of ascertaining whether the pitch could be applied to any useful purpose. Admiral Cochrane, who is possessed of the enterprising and speculative genius of his family, sent two ship loads of it to England; but after a variety of experiments, it was ascertained that, in order to render the asphaltum fit for use, it was necessary to mix such a quantity of oil with it, that the expense of the oil alone would more than exceed the price of pitch in England. A second attempt was made by a company, styled the Pitch Company, who sent out an agent from England; but finding that Admiral Cochrane had failed, and being convinced that any further attempt would be useless, he let the matter drop.

Forty miles to the southward of the Pitch Lake is Point du Cac, which forms the south-west extremity of the island, and on one side of the Boca del Sierpe. On this cape is another natural curiosity which is well worth seeing, although the distance from Port of Spain renders it rather a difficult operation to proceed thither. What renders this point so interesting to the stranger is an assemblage of mud volcanoes, of which the largest may be about 150 feet in diameter: they are situated in a plain, and are not more than four feet elevated above the surface of the ground, but within the mouths of the craters boiling mud is constantly bubbling up. At times the old craters cease to act, but when that is the case new ones invariably appear in the vicinity. The mud is fathomless, yet does not overflow, but remains within the circumference of the crater. From what I recollect of the Crimea, I should say that there is a remarkable similarity between it and Trinidad;—geologically speaking, in both there are mud volcanoes, in both there are bituminous lakes, and both have been frequently visited with earthquakes.

Berwick Barracks, September, 1832.

[*New Edinburgh Philos. Mag.*

¶ *Selections from Lectures on Pottery, delivered before the Royal Institution, London, by* A. Aikins, F. L. S. F. G. S.

(Concluded from page 264.)

Of the European manufactories of porcelain, that established at Miessen, near Dresden, by Augustus, Elector of Saxony and King of Poland, in the early part of the seventeenth century, was the first that aspired to a competition with the Chinese. In compactness of texture and infusibility, it was reckoned perfect a hundred years ago. It is not quite so white as some of the French and English porcelains, but is inferior to none in its painting, gilding, and other decorations. The figures in white biscuit of this ware now before you, belong to a friend of mine who procured them at Dresden; and the other specimens form part of a set presented to your Secretary by the King of Saxony.

The French royal manufactory at Sevrès, near Paris, has been for several years in a gradually advancing state, with regard to whiteness, compactness, and infusibility of the body, the elegance of the forms, the brilliancy of the colours, the elaborateness of the drawing, and the superb enrichments of the gilding. The private manufactories of porcelain in France, imitate and approach more or less near to the royal establishment.

The porcelain clay used at present in all the English works is obtained in Cornwall, by pounding and washing over the gray disintegrated granite which occurs in several parts of that county: by this means the quartz and mica are got rid of, and the clay resulting from the decomposition of the felspar is procured in the form of a white, somewhat gritty powder. This clay is not fusible by the highest heat of our furnaces, though the felspar, from the decomposition of which it is derived, forms a spongy, milk-white, glass, or enamel at a low white heat. But felspar, when decomposed by the percolation of water, while it forms a constituent of granite, loses the potash, which is one of its ingredients, to the amount of about fifteen per cent. and with it the fusibility that this latter substance imparts.

The silicious ingredient is calcined flint; and in some of the porcelain works, (particularly, I believe, those at Worcester,) the soapstone from the Lizard-point, in Cornwall, is employed. These are all the avowed materials; but there is little doubt that the alkalies, or alkaline earths, either pure, or in combination, are also used, in order to dispose the other ingredients to assume that state of semifusion characteristic of porcelain.

The grinding and due mixture of the ingredients, in order to obtain a mass sufficiently plastic; the forming this mass on the wheel; the subsequent drying of the ware; the first firing, by which it is brought to the state of biscuit; the application of the firmer colours occasionally on the surface of the biscuit; the dipping the biscuit in the glaze; the second firing, by which the glaze is vitrified; the pencilling in of the more tender colours on the surface of the glaze;

and the third and last firing that is given to the porcelain—so nearly resemble the same processes as applied to the more elaborate kinds of earthenware, that it would be a mere anticipation of these latter if I were to describe them now.

It is not for me to determine which of our English porcelains is the best; probably, indeed, one will be found superior in hardness, another in whiteness, a third in the thinness and evenness of the glaze, a fourth in the form of the articles, a fifth in the design, and a sixth in the colours. In hardness and infusibility they are, probably, all inferior to the Dresden and to the Sevrès porcelain; for pieces in biscuit, and in white glaze, from both these manufactories, are imported in considerable quantities, in order to be painted and finished here. But it is equally certain, that the last ten years have seen the commencement, and, in part, the completion, of such improvements in this fabric, as will probably place the English porcelains on an equality with the best of the continental European ones.

Advantage has recently been taken of the semitransparency of porcelain biscuit to form it into plates, and to delineate upon it some very beautiful copies of landscapes and other drawings, by so adapting the various thicknesses of the plate as to produce, when held between the eye and the light, the effects of light and shadow in common drawings. The invention originated in the ingenuity of our French neighbours; and some very fine specimens have been sent for exhibition by Mr. Brady.

I now proceed to the last division of my subject, namely, the manufacture of those species of glazed pottery known by the general name of Staffordshire ware.

The date of this ware is about sixty years ago, and it unquestionably originated with the late Mr. Wedgewood. It not only originated with him, but was carried by his knowledge, his skill, and his perseverance, to a degree of excellence which, in several points, has never been surpassed, and in some has never been equalled. With a liberal ambition, far above the mere love of gain, his ruling object was to carry the art that he practiced to the utmost perfection of which he was capable. For this he spared neither time, nor labour, nor expense; and his splendid success, inciting others to follow in the same track, has secured to his country a most important branch of internal and foreign commerce, and has placed his name for ever among the worthies of the British nation.

He perceived that the defects of the delft ware, at that time the only species of pottery employed for common domestic purposes, were the softness and looseness of texture of its body, which obliged the potter to make it thick, and clumsy, and heavy, in order to ensure to it a moderate durability; and that its porousness, as well as its dirty gray colour, required a thick coating of white enamel, which added still farther to its bulk and weight, and which, consisting for the most part of lead and arsenic, was hardly safe for culinary use.

He began, therefore, by inventing a body for earthenware, which, at the same time should be white, and capable of enduring a very high degree of heat without fusion, well knowing that the hardness of the

ware depended on the high firing to which it has been subjected. For this purpose, rejecting the common clays of his neighbourhood, he sent as far as Dorsetshire and Devonshire for the whiter and purer pipe-clays of those counties. For the silicious ingredient of his composition, he made choice of chalk flints, calcined and ground to powder.

It might be supposed that white sand would have answered his purpose equally well, and have been cheaper; but, being determined to give the body of his ware as great a degree of compactness as possible, it was necessary that the materials should be reduced to the state almost of an impalpable powder; and calcined flints are much more easily brought to this state by grinding, than sand would be. The perfect and equable mixture of these two ingredients being a point of great importance, he did not choose to trust to the ordinary mode of treading them together when moist, but having ground them between stones, separately, with water, to the consistence of cream, he mixed them together in this state by measure, and then evaporating the superfluous water by boiling in large cisterns, he obtained a composition of the most perfect uniformity in every part. By the combination of these ingredients in different proportions, and exposed to different degrees of heat, he obtained all the variety of texture required, from the bibulous ware employed for glazed articles, such as common plates and dishes, to the compact ware not requiring glazing, of which he made mortars and other similar articles. The almost infusible nature of the body allowed him also to employ a thinner and less fusible glaze, that is, one in which no more lead entered than in common flint glass, and therefore incapable of being affected by any articles of food contained or prepared in such vessels. With these materials, either in their natural white, or variously coloured—black by manganese, blue by cobalt, brown and buff by iron—he produced imitations of the Etruscan vases, and of various other works of ancient art, such as the world had never before seen—such as no subsequent artist has ever attempted to rival. His copies of the Portland vase, of which the liberality of Mr. Pellatt enables me to lay before you a faultless specimen, are miracles of skill; and the other specimens of similar works, for the exhibition of most of which you are indebted to Mr. Josiah Wedgewood, his son and successor, may give some idea of the many beautiful works that were produced in his manufactory.

In table ware for many years he led the way almost without a rival; but the immense demand occasioned by the successive improvements of this article, which first put down the use of delft, and then of pewter, gave ample room and encouragement to men of capital and skill to enter the field of profit and competition. Much good has hence resulted: many subordinate improvements have been effected, and are almost daily making; and a new variety of ware, called ironstone, has been invented, and so rapidly and judiciously improved, that, in appearance, and in many of its intrinsic properties, it bears a close resemblance to the older and coarser porcelains of China itself.

I shall conclude by a summary account of the manufacture of the

best table ware; for a considerable part of which I am indebted to notes taken by Capt. Bagnold, when visiting a pottery, inferior, perhaps, to none in the country. For the copious and interesting collection of specimens of almost every variety of Staffordshire table ware, we are under great obligation to Mr. Pellatt and Mr. Davenport.

The materials of the Staffordshire ware are calcined flints and clay. 'The flints are burnt in kilns, and then, while hot, quenched in water, by which they are cracked through their whole substance. After being quenched they are ground in mills with water. The mill is a hollow cylinder of wood bound with hoops, and having a bottom of blocks of chert, a hard, tough, silicious stone: the mill-shaft is perpendicular, and has two horizontal arms passing through it crosswise. Between these arms are laid loose blocks of chert, which are moved round on the bed-stone as the arms revolve, and thus grind the flint with water to the consistence of cream.

The clay from Dorsetshire and Devonshire, is mixed with water, and in this state is passed through fine sieves to separate the grosser particles. The flint and clay are now mixed by measure, and the mud or cream is passed through a sieve in order to render the mixture more complete.

In this state it is called slip, and is now evaporated to a proper consistence in long brick troughs. It is then tempered in a pug mill, which is an iron cylinder placed perpendicularly, in which an arbor or shaft revoles, having several knives projecting from it, the edges of which are somewhat depressed. By the revolution of these the clay is cut or kneaded, and finally is forced by their action through a hole in the bottom of the cylinder, and is now ready for use. Cups, pots, basins, and other round articles, are turned rough on the horizontal potter's wheel, and, when half dried, are again turned in a lathe. They are then fully dried in a stove, and the remaining roughnesses are afterwards removed by friction with coarse paper. Articles that are not round, and the round ones that have embossed designs on their surface, are made of thin sheets of clay rolled out like dough, and then pressed into moulds of plaster of Paris; the moulds being previously dried absorb the superficial moisture of the clay, and thus allow it to part from them without injury. The two or three separate pieces composing the article are then united by means of fluid slip. Spouts and handles of jugs and tea pots are made and united with the body of the vessel in the same way. Small handles, beadings, mouldings, &c. are formed by means of an iron cylinder, having its bottom perforated so as to mould the clay, as it passes through, into the required figure. A piston is inserted into the top of the cylinder, and caused to descend slowly by means of a screw, in consequence of which the clay is continually passing out through the perforation, and is cut off in lengths.

Plates are beaten or rolled out of a lump of clay, and are then laid on a mould turned to the shape of the upper surface of the plate. A rotary motion is given to the mould, and an earthenware tool representing a section of the plate is pressed upon it; thus the plate is made smooth, has a uniform thickness given to it, and it takes a per-

fect cast of the mould. Cups, saucers, and basins, when rough-turned, are dried on the block to prevent them from warping.

The ware being thoroughly dried, is packed into saggars and burnt in the furnace to biscuit. Patterns for flat, or nearly flat surfaces, are put on by printing the pattern from a copper plate with an ink composed of oxide of cobalt, oxide of iron, or other colouring matter, mixed with oil. The impression is taken on soft paper, and is applied to the surface of the biscuit, and slightly rubbed to make the print adhere: the biscuit is then soaked in water till the paper may be stripped off, leaving the print or pattern behind. The ware is then dipped in the glaze, which is a mixture of flint slip and white lead, and the bibulous quality of the biscuit causes a sufficient quantity to adhere: the piece is then dried and again passed into the furnace, which brings out the colours of the pattern, and at the same time vitrifies the glaze.

The finest patterns are applied after the glazing has been completed, by taking the impressions from the copper plate on a flexible strap covered with a strong gelatinous mixture of glue and treakle. This strap is then pressed on the ware, and gives the impression in glue, the colouring powder is then dusted over it, and a sufficient portion adheres to the damp parts to give the pattern, after having been again in the furnace. The more elaborate patterns on earthenware, and all those on porcelain, are finished by pencilling in.

[*Rep. Pat. Inv.*

¶ *London Fires in* 1832.

There were, in the year 1832, two hundred and nine fires, as exhibited in the following table.

Months.	Number of Fires.	Number of fatal Fires.	Number of Lives lost.
January . .	28	0	0
February .	23	0	0
March . .	19	1	1
April . .	16	0	0
May . .	13	1	3
June . .	9	0	0
July . . .	16	0	0
August . .	14	0	0
September . .	15	1	1
October . .	18	1	1
November . .	15	0	0
December .	23	3	3
Total. .	209	7	9

Of this number of buildings attacked by fire, there have been consumed . . . 50
Partly consumed . . 6
And slightly damaged . . 153

209

The premises at which the fires happened, were occupied as follows:—

Bakers	10
Blacking makers	1
Booksellers and stationers	4
Bookbinders	2
Boot and shoemakers	3
Brass founders	2
Brewers	2
Brush and broom makers	2
Cabinet makers	6
Carpenters and box makers	7
Carvers and gilders	2
Chandlers	6
Cheesemongers	2
Chemists and druggists	3
Coachmakers	2
Coal merchants	1
Coffee and eating houses	5
Coopers	1
Distillers	1
Dwellings, private	50
Dyers	1
Featherbed makers	1
Fellmongers	1
Fringe and lace dealers	2
Glass warehouses	3
Greengrocers and fruiterers	6
Grocers and tea dealers	5
Haberdashers and hosiers	3
Hatters	1
Ironmongers	1
Jewellers	2
Lampblack makers	1
Leather cutters	1
——— hose and bucket makers	1
Linen drapers	1
Machinists	2
Milliners and dress makers	2
Milkmen	2
Music sellers	1
Oil and colour men	10
Opticians	1
Pawnbrokers	2

Plumbers, painters, and glaziers	2
Pocket book makers	2
Printers	2
Rag merchants	1
Sack makers	1
Scaleboard makers	1
Shipwrights	1
Silversmiths	1
Soap makers	1
Soda-water makers	1
Stables	2
Straw bonnet makers	2
Sugar makers	1
Summer houses	2
Tailors	3
Timber merchants	2
Tinmen	4
Victuallers, licensed	14
Wadding makers	1
Wine merchants,	3
Total	209

For the last three or four years the number of fires has been gradually decreasing; and not only has the number been diminished, but the extent of the conflagrations has also been, upon an average, much more limited than formerly. During the last year there were not above half a dozen fires of any considerable magnitude.

The number of lives lost, as per foregoing statement, is nine; but the total number of persons burnt to death, from the accidental ignition of wearing apparel, &c. is much greater.

After encountering considerable difficulties, arising from various causes, the Lambeth Water company have at length completed a capacious reservoir on Brixton Hill, upwards of one hundred and eighty feet above the level of high water mark, a supply from which, in case of fire, will be available all over the Lambeth Company's district. The reservoir is supplied from the works in Belvidere road, by a splendid *single-acting* steam engine, (by Messrs Maudsley and Field,) of one hundred and ten horse power. This particular form of engine, however, is in the present case injudiciously employed, and the consequences have been a series of shocks upon the mains, so violent as to occasion continual bursting.

I stated in my last communication on this subject, (Mech. Mag. Jan. 28, 1832,) that some of the insurance companies had formed a kind of league, with a view to the reduction of their individual expenses. During the past year the Sun fire office, one of the parties to the above union, have taken up the matter with great spirit, and led the way in an attempt to alter and amend the fire engine arrangements of the metropolis. Their endeavours have, to a certain extent, been crowned with success, and have produced the formation

of a general "London Fire-engine Establishment," which has been joined by ten insurance companies.

The remaining seven offices refuse to join the brigade (as the establishment is frequently termed,) and continue to work their men and engines on the old plan.

The affairs of the London Fire-engine Establishment are managed by a committee, consisting of a director or secretary from each of the Insurance Companies that have joined it, and who subscribe towards its support in certain agreed proportions. The annual expense of the establishment will be nearly £8,000.

The metropolis has been divided into five districts.

The force consists of eighty men, in the permanent employ of the establishment, a great majority of whom have been selected frem the firemen hitherto employed by the above ten insurance companies, and who have relinquished all other occupations on being appointed to the establishment. Instead of the men being under the distinct officers appointed by each company, and therefore not acting in concert at fires, they are now embodied under the direction of a superintendent, with foremen and engineers under him, and appointed to certain stations, where a portion of them are in constant attendance day and night, prepared to give the most prompt assistance on all occasions of fire.

There is one engineer, two senior, and three junior firemen attached to every engine station in each district, one-third of whom are constantly on duty at the different engine houses, night and day; and the whole force are liable to be called up for attendance at fires, or for any other duty. In general, the attendance will be arranged as follows:—

If a fire happen in district A, the whole of the men and engines of that district will immediately repair to the spot; two-thirds of the men, and one of the engines from each of the districts B and D will also go to the fire, and one-third of the men from each of the districts C and E.

If the fire happen in B, the whole of the men and engines in that district will immediately repair to the fire; one engine from A, another from C; two-thirds of the men from A, C, and E, and one-third of the men from D.

If the fire happen in C, the whole of the men and engines in that district will immediately repair to the fire; one engine and two-thirds of the men from each of the districts B and E, and one-third of the men from A and D, will go to the fire.

If the fire is in E, the whole of the men and engines in that district, with one engine and two-thirds of the men from each of the districts C and D, and one-third of the men from A and B, will go to the fire.

If the fire happen in D, the whole of the men and engines in that district, with one engine and two-thirds of the men from each of the districts A and E, and one-third of the men from B and C, will go to the fire.

If a fire happens on the boundary of a district, and it is doubtful in which district it has occurred, the whole of the engines and men

of the two adjoining districts are instantly to proceed to the spot, and one-third of the men of the three remaining districts.

In case of emergency the superintendent will call in such additional force as he may require.

The engines will be conveyed to fires at no less than seven miles an hour, and the men who do not accompany the engines will go at not less than five miles an hour.

The men are clothed in a dark gray uniform trimmed with red, having their respective numbers in red on the left breast; they have black leather waist-belts, and hardened leather caps or helmets. Their dress is neat and appropriate, and much more conducive to safety and comfort than that formerly worn. The leather caps especially afford a very great protection to the wearers, and it is somewhat strange that they should ever have fallen into disuse, for they were some years back very common. The new caps, however, are better made, more convenient, and much smarter than those formerly used.

Each engine is provided with the following judicious selection of useful articles:—Two lengths of scaling ladder, each eight to nine feet long, all of which may be readily connected, forming in a short space of time, a ladder of any required height; a canvass sheet, with ten or twelve handles of rope round the edge of it. One ten fathom, and one fourteen fathom piece of two and a half inch rope. Six forty feet lengths of hose. Two branch pipes, one two and a half feet, and the other from four to six feet long; with one spare nose piece. Two six feet lengths of suction pipe. A flat rose, standcock, goose-neck, dam-board, boat-hook, saw, shovel, mattock, poleaxe, crow-bar, and two dog-tails. A ball of strips of sheep-skin, a ball of small cord, and instruments for opening plugs, fire-cocks, &c.

The above list shows that the attention of the firemen is especially directed to the saving of human life as well as the rescue of property and the most speedy suppression of fire.

[*Mech. Mag.*

A few remarks on the Relation which subsists between a Machine and its Model. By EDWARD SANG, *Teacher of Mathematics, Edinburgh. Communicated by the Author.*

At first sight, a well constructed model presents a perfect representation of the disposition and proportion of the parts of a machine, and of their mode of action.

Misled by the alluring appearance, one is apt, without entering minutely into the inquiry, also to suppose that the performance of a model is, in all cases, commensurate with that of the machine which it is formed to represent. Ignorant of the inaccuracy of such an idea, too many of our ablest mechanicians and best workmen waste their time and their abilities on contrivances which, though they perform well on the small scale, must, from their very nature, fail when en-

larged. Were such people acquainted with the mode of computing the effects, or had they a knowledge of natural philosophy, sufficient to enable them to understand the basis on which such calculations are founded, we should see fewer crude and impracticable schemes prematurely thrust upon the attention of the public. This knowledge, however, they are too apt to regard as unimportant, or as difficult of attainment. They are startled by the absurd distinction which has been drawn between theory and practice, as if theory were other than a digest of the results of experience; or, if they overcome this prejudice, and resolve to dive into the arcana of philosophy, they are bewildered among names and signs, having begun the subject at the wrong end. That the attainment of such knowledge is attended with difficulty is certain, but it is with such difficulty only as can be overcome by properly directed application. It would be, indeed, preparing disappointment to buoy them up with the idea, that knowledge, even of the most trivial importance, can be acquired without labour. Yet it may not be altogether unuseful, for the sake both of those who are already, and of those who are not, acquainted with these principles, to point out the more prominent causes, on account of which the performance of no model can, on any occasion, be considered as representative of that of the machine. Such a notice will have the effect of directing the attention, at least, to this important subject. In the present state of the arts, the expense of constructing a full-sized instrument is, in almost every instance, beyond what its projector would feel inclined, or even be able, to incur. The formation of a model is thus universally resorted to, as a prelude to the attempt on the large scale. An inquiry, then, into the relation which a model bears to the perfect instrument, can hardly fail to carry along with it the advantage of forming a tolerable guide, in estimating the real benefit which a contrivance is likely to confer upon society.

In the following paper I propose to examine the effect of a change of scale on the strength and on the friction of machines, and, at the same time, to point out that adherence to the strictest principles which is apparent in all the works of nature, and of which I mean to avail myself in fortifying my argument.

Previous, however, to entering on the subject-proper, it must be remarked that, when we enlarge the scale according to which any instrument is constructed, its surface and its bulk are enlarged in much higher ratios. If, for example, the linear dimensions of an instrument be all doubled, its surface will be increased four, and its solidity eight, fold. Were the linear dimensions increased ten times, the superfices would be enlarged one hundred, and the solidity one thousand, times. On these facts, the most important which geometry presents, my after remarks are mostly to be founded.

All machines consist of moveable parts, sliding or turning on others, which are bound together by bands, or supported by props. To the frame work I shall first direct my attention.

In the case of a simple prop, destined to sustain the mere weight of some part of the machine, the strength is estimated at so many hundred weights per square inch of cross section. Suppose that, in the

model, the strength of the prop is sufficient for double the load put on it, and let us examine the effect of an enlargement, ten fold, of the scale according to which the instrument is constructed. By such an enlargement, the strength of the prop would be augmented 100 times; it would be able to bear 200 loads such as that of the model, but then the weight to be put on it would be 1000 times that of the small machine, so that the prop in the large machine would be able to bear only the fifth part of the load to be put on it. The machine, then, would fall to pieces by its own weight.

Here we have one example of the erroneous manner in which a model represents the performance of a large instrument. The supports of small objects ought clearly to be smaller in proportion than the supports of large ones. Architects, to be sure, are accustomed to enlarge and to reduce in proportion; but nature, whose structures possess infinitely more symmetry, beauty, and variety, than those of which art can boast, is content to change her proportions at each change of size. Let us conceive an animal having the proportions of an elephant and only the size of a mouse; not only would the limbs of such an animal be too strong for it, they would also be so unwieldy that it would have no chance among the more nimble and better proportioned creatures of that size. Reverse the process, and enlarge the mouse to the size of an elephant, and its limbs, totally unable to sustain the weight of its immense body, would scarcely have strength to disturb its position even when recumbent.

The very same remarks apply to that case in which the weight, instead of compressing, distends the support. The chains of Trinity Pier are computed to be able to bear nine times the load put on them. But if a similar structure were formed of ten times the linear dimensions, the strength of the new chain would be one hundred times the strength of that at Trinity, while the load put upon it would be one thousand times greater; so that the new structure would possess only nine-tenths of the strength necessary to support itself. Of how little importance, then, in bridge building, whether a model constructed on a scale of perhaps one to a hundred support its own weight! Yet, on such grounds, a proposition for throwing a bridge of two arches across the Forth, at Queensferry, was founded. Putting out of view the roadway and passengers altogether, the weight of the chain alone would have torn it to pieces. The larger species of spiders spin threads much thicker, in comparison with the thickness of their own bodies, than those spun by the smaller ones. And, as if sensible that the whole energies of their systems would be expended in the frequent reproduction of such massy webs, they choose the most secluded spots; while the smaller species, dreading no inconvenience from a frequent renewal of theirs, stretch them from branch to branch, and often from tree to tree. I have often been astonished at the prodigious lengths of these filaments, and have mused on the immense improvement which must take place in science, and in the strength of materials too, ere we could, individually undertake works of such comparative magnitude.

When a beam gives support laterally, its strength is proportioned

to its breadth, and to the square of its depth conjointly. If, then, such a beam were enlarged ten times in each of its linear dimensions, its ability to sustain a weight placed at its extremity would, on account of the increased distance from the point of insertion, be only one hundred times augmented, but the load to be put upon it would be one thousand times greater; and thus, although the parts of the model be quite strong enough, we cannot thence conclude that those of the enlarged machine will be so.

It may thus be stated as a general principle, that, in similar machines, the strengths of the parts vary as the square, while the weights laid on them vary as the cube of the corresponding linear dimension.

This fact cannot be too firmly fixed in the minds of machine makers; it ought to be taken into consideration even on the smallest change of scale, as it will always conduce either to the sufficiency or to the economy of a structure. To enlarge or diminish the parts of a machine all in the same proportion, is to commit a deliberate blunder. Let us compare the wing of an insect with that of a bird: enlarge a midge till its whole weight be equal to that of the sea-eagle, and, great as that enlargement must be, its wing will scarcely have attained the thickness of writing paper;—the falcon would feel rather awkward with wings of such tenuity. The wings of a bird, even when idle, form a conspicuous part of the whole animal; but there are insects which unfold, from beneath two scarcely perceived covers, wings many times more extensive than the whole surface of their bodies.

The larger animals are never supported laterally; their limbs are always in a position nearly vertical: as we descend in the scale of size the lateral support becomes more frequent, till we find whole tribes of insects resting on limbs laid almost horizontally. The slightest consideration will convince any one that lateral or horizontal limbs would be quite inadequate to support the weight of the larger animals. Conceive a spider to increase till his body weighed as much as that of a man, and then fancy one of us exhibiting feats of dexterity with such locomotive instruments as the spider would then possess!

The objects which I have hitherto compared have been remote, that the comparisons might be the more striking; but the same principles may be exhibited by the contrast of species the most nearly allied, or of individuals even of the same species. The larger species of spiders, for instance, rarely have their legs so much extended as the smaller ones; or, to take an example, from the larger animals, the form of the Shetland poney is very different from that of the London dray horse.

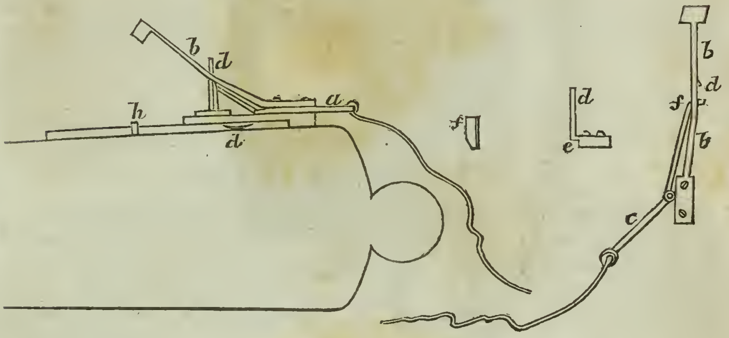
How interesting it is to compare the different animals, and to trace the gradual change of form which accompanies each increase of size! In the smaller animals, the strength is, as it were, redundant, and there is room for the display of the most elaborate ornament. How complex or how beautiful are the myriads of insects which float in the air, or which cluster on the foliage! Gradually the larger of these become more simple in their structure, their ornaments less profuse. The structure of the birds is simpler and more uniform, that of the

quadrupeds still more so. As we approach the larger quadrupeds, ornament, and then elegance disappear. This is the law in the works of nature, and this ought to be the law among the works of art.

Among one class of animals, indeed, it may be said that this law is reversed. We have by no means a general classification of the fishes; but, among those with which we are acquainted, we do not percieve such a prodigious change of form. Here, however, the animal has not to support its own weight; and whatever increase may take place in the size of the animal, a like increase takes place in the buoyancy of the fluid in which it swims. Many of the smaller aquatic animals exhibit the utmost simplicity of structure; but we know too little of the nature of their functions to draw any useful conclusions from this fact.

[TO BE CONTINUED.]

¶ *French Percussion Gun Lock.*



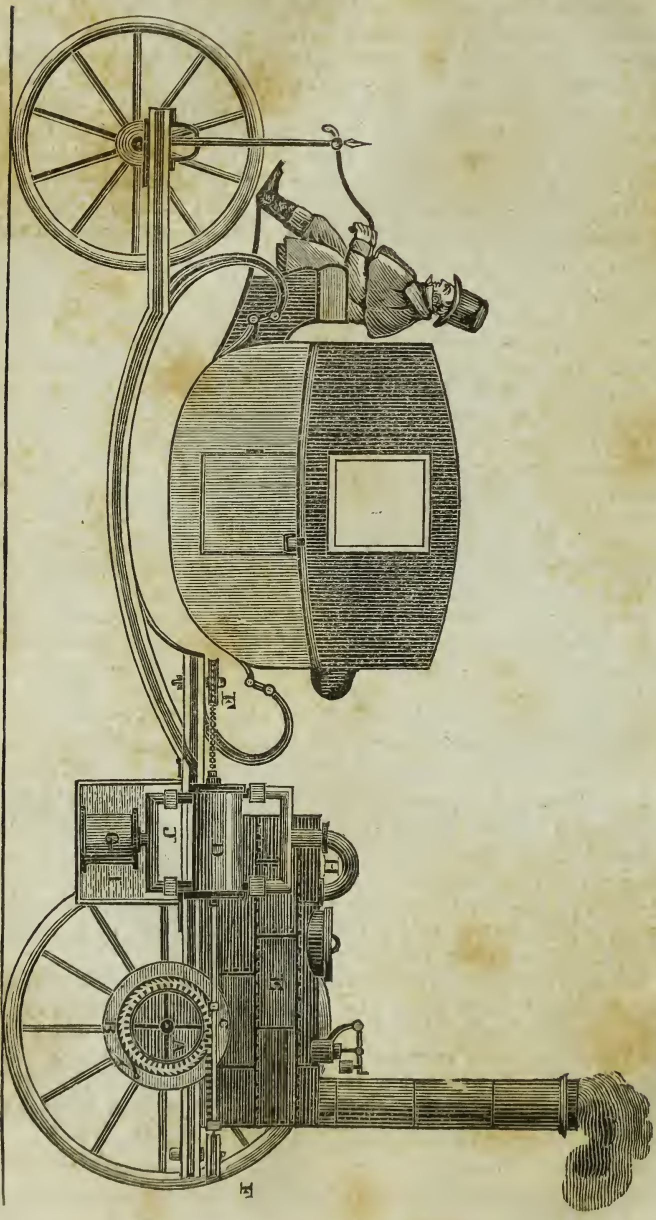
SIR,—The lock represented in the above drawings, fixes to the gun in the usual manner by *one* nut at *a*; the spring and hammer are both in one, *b*; the trigger *c* has its upper part sloped a little, as shown in the separate front view of it, *f*, by which means the spring is detained so as to require some force to liberate it; the guide *d* bears the spring a little on one side till it reaches the bottom, at which a part is filed away as at *e* in the side view.

When the trigger is pulled with the requisite force, the spring descends along the side of the guide *d*, the hammer strikes the cap at *h*, and immediately slips to the right into the notch *e*, by which means the vent is instantly comeatable to be stopped, pricked, and primed.

In cocking, the hammer is laid hold of and borne to the left sufficiently to clear the spring of the notch *e*; it is then lifted up and locked with the trigger, as represented in the figure.

[*Mech. Mag.*

¶ *Mr. Symington's Steam Carriage Experiments.* 1784-86.



Sir,—The drawing now sent, represents the model of a steam carriage, which was invented by my father in 1784, and was exhibited by him to the Professors of the University, and other scientific gentlemen in Edinburgh, in 1786.

The opinion entertained of the practicability of the invention was so favourable, that my father was warmly urged to bring his experiments into practice; and the late Gilbert Meason, Esq., who always proved his patron, liberally offered to defray any expenses which might be incurred.

The state of the roads, and the difficulty which at that time would have existed of procuring water and fuel, afforded sufficient reasons to induce my father to abandon an attempt, which, through these causes, he believed, would only have produced disappointment to his kind advisers.

Whilst engaged with this model, the idea occurred to him, that upon the same principles vessels might be propelled on water by the power of steam; an idea, the correctness of which was fully proved by the exemplification afforded in 1788, on Dalswinton Lake, of which exemplification a sketch will be furnished as soon as time will permit.

Feeling obliged by your prompt attention to my former communication,

I remain, sir,
Your most obedient servant,
Bromley, Sept. 24. Wm. Symington.

Description of the Engraving.

A, the drum, fixed upon the hind axle. B, tooth and ratchet wheels; C, rack-rods, one on each side of the drum, the alternate action of which, upon the tooth and ratchet wheels, produces the rotary motion. D, cylinder. E, boiler, supplied from condensor. FF, direction-pulleys. G, condensor. H, steam-pipe. I, water-tank. J, eduction pipe.

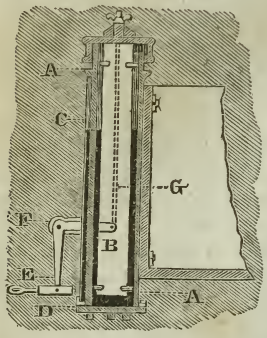
A material advantage obtained by the mode here employed, of applying the power of the engine, is its always acting at a right angle upon the axle of the carriage.

[*Mech. Mag.*

¶ *Milne's Mercurial Dynamometer.*

Practical engineers complain that those dynamometers which indicate the quantum of force applied by a horse upon a rail-way, by the inflexion of springs, lose their elasticity when kept at work for any considerable time; the oscillations of the index-pointer, too, make it impossible to ascertain the medium of unequal draught applied by the animal in stepping out. Such also is the case when any other common instrument is used for this purpose. Both of these defects are completely obviated by the mercurial dynamometer now to

be described. This instrument consists of a hollow metallic cylinder, A, in which is placed a floating piston, B, which should be about one-tenth of an inch less in diameter than the cylinder, in which it must move freely up or down. To prevent friction, four small rollers should be inserted into the side of this wooden float both at its top and bottom; which rollers should not project further than to admit of the piston being "shake free" within its cylinder. In order, also, to prevent absorption of the mercury, the wood should be coated with bees' wax mixed with whiteing or with lampblack. These things being attended to, and a portion of mercury placed within the cylinder, by pushing down the piston, the fluid will ascend in a thin film between it and the cylinder, till the statical weight of the mercury, acting on the base of the floating piston, balances the force exerted in pushing it down. Hence, since the statical weight of the fluid increases reciprocally as the height to which it is caused to ascend by its displacing force, so must its various points of height within the cylinder be a measure of the force in equilibrio with the statical weight of the fluid.



Such being the construction of this dynamometer, it is only necessary to fix it in a vertical position to the front of the foremost of a train of waggons, and to turn the direction of the horses' draught in such a manner as to cause it to pull down the floating piston; while a glass tube exhibits the height of the fluid, and consequently the force exerted by the animal. To prevent any sudden elevations or depressions in the mercury in the tube, from the irregularity of the horse's draught, the socket in which it is placed has a ventricle, at D, the diameter of which is .033 of an inch, while that of the glass tube is .250; wherefore $\frac{.250^2}{.033^2} = 57.4$; hence the elevation or depression of the mercury in the tube must be 57.4 times less than in the cylinder; the celerity of which fluid, too, is still further reduced by springs attached to the draught-hook. Since this machine was first constructed, it has occurred to Mr. Milne, that by attaching a stop-cock, the celerity of the motion of the mercury in the glass tube could be regulated to any required extent with the utmost exactness. In addition to these contrivances, oscillations of the fluid might be still further prevented by making the yoke levers, E, shorter than those which pull down the piston. The friction of the arbor, F, might also be much lessened by making its extremities similar to the bearing pivots of a common balance.

Mr. Granger, the engineer, having placed this dynamometer on a carriage so constructed that neither the weight of the instrument nor of the persons upon it should affect the results, made a number of very interesting and useful experiments with it on the Kirkintilloch

rail-way. The first object in these experiments was to ascertain the capabilities of the dynamometer; on which head nothing can be more satisfactory than the testimony Mr. G. has given. "It is altogether superior, he says, "to any other I have seen; and it is the opinion of several engineers who have seen it at work that it is the best instrument for engineering purposes that has ever been tried. A long and circumstantial narrative of these experiments is given, but it is only necessary that we should here place before our readers the principal facts which they have established with respect to friction on rail-ways.

1. The medium friction of a train of five wagons on a level part of the rail-way was nine pounds per ton; while on a curved part, with a radius of about 800 feet, it was eighteen pounds per ton.

2. A draught of 10.8 lbs. per ton was required to travel at the rate of three miles an hour when the rails were dry, and only 6.8 lbs. when wet.

3. On a level, the force exerted by a horse was observed to vary from 90 to 100 lbs., but when the train came to a part of the rail-way which inclined at the rate of 1 in 280, the wagons descended freely by their own gravity.

4. On a descent of 1 in 117, a wagon with wheels 2.5 feet in diameter carried 1020 lbs. more weight than one with three feet wheels, at the same rate of speed, and with the same power applied; but on a curve with a radius of 1000 feet the three feet wheels proved superior to the 2.5—a circumstance which Mr. Mylne ascribes to the axles of the three feet wheels being of two pieces, meeting within a bush at the centre, while the 2.5 wheels were attached by an inflexible axle, whence it followed, in the case of the former, that "all the wheels would roll upon the rails of different radii, independent of the motions of each other."

5. The average force of draught required on a level at 3.5 miles per hour was eight pounds per ton; at 6.66 miles, 9.5 lbs.; at 7.5 miles, 10.2 lbs.; at eight miles, 10.67 lbs.; at 8.57 miles, 11.63 lbs.

[*Mech. Mag.*

Tincture of Roses.

Take the leaves of the common rose (*centifoliæ*,) place them without pressing them in a bottle, pour some good spirits of wine upon them, and let it stand until it is required for use. This tincture will keep for years, and yield a perfume little inferior to attar of roses: a few drops of it will suffice to impregnate the atmosphere of a room with a delicious odour. Common vinegar is greatly improved by a very small quantity being added to it.

[*Reg. of Arts.*

¶ Popular Science.

No. IV.

Selections from Letters on Natural Magic.
By Sir David Brewster.

(Continued from p. 288.)

Acoustic Mechanism—Automata.

Many very ingenious pieces of acoustic mechanism have been from time to time exhibited in Europe. The celebrated Swiss mechanist M. Le Droz constructed for the king of Spain the figure of a sheep, which imitated in the most perfect manner the bleating of that animal; and likewise the figure of a dog watching a basket of fruit, which, when any of the fruit was taken away, never ceased barking till it was replaced.

The singing bird of M. Maillardet, which he exhibited in Edinburgh many years ago, is still more wonderful.* An oval box, about three inches long, was set upon the table, and in an instant the lid flew up, and a bird of the size of the humming-bird, and of the most beautiful plumage, started from its nest. After fluttering its wings, it opened its bill and performed four different kinds of the most beautiful warbling. It then darted down into its nest, and the lid closed upon it. The moving power in this piece of mechanism is said to have been springs, which continued their action only four minutes. As there was no room within so small a figure for accommodating pipes to produce the great variety of notes which were warbled, the artist used only one tube, and produced all the variety of sounds by shortening and lengthening it with a moveable piston.

Ingenious as these pieces of mechanism are, they sink into insignificance when compared with the machinery of M. Vaucanson, which had previously astonished all Europe. His two principal automata were the flute player, and the pipe and tabor player. The flute player was completed in 1736, and wherever it was exhibited it produced the greatest sensation. When it came to Paris it was received with great suspicion. The French scavans recollected the story of M. Raisin, the organist of Troyes, who exhibited an automaton player upon the harpsichord, which astonished the French court by the variety of its powers. The curiosity of the king could not be restrained, and in consequence of his insisting upon examining the mechanism, there was found in the figure a pretty little musician five years of age. It was natural, therefore, that a similar piece of mechanism should be received with some distrust; but this feeling was soon removed by M. Vaucanson, who exhibited and explained to a committee of the Academy of Sciences the whole of the mechanism. This learned body was astonished at the ingenuity which it displayed; and

* A similar piece of mechanism had been previously made by M. le Droz.

they did not hesitate to state, that the machinery employed for producing the sounds of the flute performed in the most exact manner the very operations of the most expert flute player, and that the artist had imitated the effects produced and the means employed by nature, with an accuracy which exceeded all expectation. In 1738 M. Vaucanson published a memoir, approved of by the Academy, in which he gave a full description of the machinery employed, and of the principles of its construction. Following this memoir, I shall therefore attempt to give as popular a description of the automaton as can be done without lengthened details and numerous figures.

The body of the flute player was about five and a half feet high, and was placed upon a piece of rock, surrounding a square pedestal four and a half feet high by three and a half wide. When the panel which formed the front of the pedestal was opened, there was seen on the right a clock movement, which, by the aid of several wheels, gave a rotatory motion to a steel axis about two and a half feet long, having cranks at six equidistant points of its length, but lying in different directions. To each crank was attached a cord, which descended, and was fixed by its other end to the upper board of a pair of bellows, two and a half feet long and six inches wide. Six pair of bellows arranged along the bottom of the pedestal were then wrought or made to blow in succession, by turning the steel axis.

At the upper face of the pedestal, and upon each pair of bellows, is a double pulley, one of whose rims is three inches in diameter, and the other one and a half. The cord which proceeds from the crank coils round the smallest of these pulleys, and that which is fixed to the upper board of the bellows goes round the larger pulley. By this means the upper board of the bellows is made to rise higher than if the cords went directly from them to the cranks.

Round the larger rims of three of these pulleys, viz. those on the right hand, there are coiled three cords, which, by means of several smaller pulleys, terminate in the upper boards of other three pair of bellows placed on the top of the box.

The tension of each cord when it began to raise the board of the bellows to which it is attached gives motion to a lever placed above it between the axis and the double pulley in the middle and lower region of the box. The other end of this lever keeps open the valve in the lower board of the bellows, and allows the air to enter freely, while the upper board is rising to increase the capacity of the bellows. By this means there is not only power gained, in so far as the air gains easier admission through the valve, but the fluttering noise produced by the action of the air upon the valves, is entirely avoided, and the nine pair of bellows are wrought with great ease, and without any concussion or noise.

These nine bellows discharge their wind into three different and separate tubes. Each tube receives the wind of three bellows, the upper boards of one of the three pair being loaded with a weight of four pounds, those of the second three pair with a weight of two pounds, and those of the other three pair with no weight at all. These three tubes ascended through the body of the figure, and terminated in three

small reservoirs placed in its trunk. These reservoirs were thus united into one, which, ascending into the throat, formed by its enlargement the cavity of the mouth terminated by two small lips, which rested upon the hole of the flute. These lips had the power of opening more or less, and by a particular mechanism they could advance or recede from the hole in the flute. Within the cavity of the mouth there is a small moveable tongue for opening and shutting the passage for the wind through the lips of the figure.

The motions of the fingers, lips, and tongue of the figure were produced by means of a revolving cylinder thirty inches long and twenty one in diameter. By means of pegs and brass staples fixed in fifteen different divisions in its circumference, fifteen different levers, similar to those in a barrel organ, were raised and depressed. Seven of these regulated the motions of the seven fingers for stopping the holes of the flute, which they did by means of steel chains rising through the body and directed by pulleys to the shoulder, elbow, and fingers. Other three of the levers communicating with the valves of the three reservoirs regulated the ingress of the air, so as to produce a stronger or a weaker tone. Another lever opened the lips so as to give a free passage to the air, and another contracted them for the opposite purpose. A third lever drew them backwards from the orifice of the flute, and a fourth pushed them forward. The remaining lever enabled the tongue to stop up the orifice of the flute.

Such is a very brief view of the general mechanism by which the requisite motions of the flute player were produced. The airs which it played were probably equal to those executed by a living performer, and its construction, as well as its performances, continued for many years to delight and astonish the philosophers and musicians of Europe.

Encouraged by the success of this machine, M. Vaucanson exhibited in 1741 other automata, which were equally, if not more, admired. One of these was the automaton duck, which performed all the motions of that animal, and not only ate its food, but digested it; and the other was his pipe and tabor player, a piece of mechanism which required all the resources of his fertile genius. Having begun this machine before he was aware of its peculiar difficulties, he was often about to abandon it in despair, but his patience and his ingenuity combined enabled him, not only to surmount every difficulty, but to construct an automaton which performed complete airs, and greatly excelled the most esteemed performers on the pipe and tabor.

The figure stands on a pedestal, and is dressed like a dancing shepherd. He holds in one hand a flageolet, and in the other a stick with which he beats the tambourin as an accompaniment to the airs of the flageolet, about twenty of which it is capable of performing. The flageolet has only three holes, and the variety of its tones depends principally on a proper variation of the force of the wind, and on the different degrees with which the orifices are covered. These variations in the force of the wind required to be given with a rapidity which the ear can scarcely follow, and the articulation of the tongue was required for the quickest notes, otherwise the effect was

far from agreeable. As the human tongue is not capable of giving the requisite articulations to a rapid succession of notes, and generally slurs over one-half of them, the automaton was thus able to excel the best performers, as it played complete airs with articulations of the tongue at every note.

In constructing this machine M. Vaucanson observed that the flageolet must be a most fatiguing instrument for the human lungs, as the muscles of the chest must make an effort equal to fifty-six pounds in order to produce the highest notes. A single ounce was sufficient for the lowest notes; so that we may, from this circumstance, form an idea of the variety of intermediate effects required to be produced.

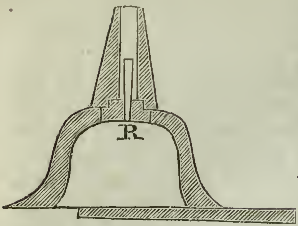
While M. Vaucanson was engaged in the construction of these wonderful machines, his mind was filled with the strange idea of constructing an automaton containing the whole mechanism of the circulation of the blood. From some birds which he made he was satisfied of its practicability; but as the whole vascular system required to be made of elastic gum, or caoutchouc, it was supposed that it could only be executed in the country where the caoutchouc tree was indigenous. Louis XVI. took a deep interest in the execution of this machine. It was agreed that a skilful anatomist should proceed to Guyana, to superintend the construction of the blood-vessels, and the king had not only approved of, but had given orders for, the voyage. Difficulties, however, were thrown in the way: Vaucanson became disgusted, and the scheme was abandoned.

The two automata which we have described were purchased by Professor Bayreuss of Helmstadt, but we have not been able to learn whether or not they still exist.

Towards the end of the seventeenth century, a bold and almost successful attempt was made to construct a *talking automaton*. In the year 1779, the Imperial Academy of Sciences at St. Petersburg proposed as the subject of one of their annual prizes an inquiry into the nature of the vowel sounds, A, E, I, O, U, and the construction of an instrument for artificially imitating them. This prize was gained by M. Kratzenstein, who showed that all the vowels could be distinctly pronounced by blowing through a reed into pipes of different figures.

About the same time that Kratzenstein was engaged in these researches, M. Kempelen of Vienna, a celebrated mechanician, was occupied with the same subject. In his first attempt he produced the vowel sounds by adapting a reed R, fig. 48, to the bottom of a funnel-shaped cavity AB, and placing his hand in various positions within the funnel. This contrivance, however, was not fitted for his purpose; but after long study, and a diligent examination of the organs of speech, he contrived a hollow oval box, divided into portions attached by a hinge so as to resemble jaws. This box received the sound which issued from the tube connected with the reed, and by opening and closing the jaws he produced the sounds A, O, OU, and an imperfect E, but no indications of an I. After two years' labour he succeeded in obtaining from different jaws the sound of the

Fig. 48.



consonants P, M, L, and by means of these vowels and consonants he could compose syllables and words, such as *mamma*, *papa*, *aula*, *lama*, *mulo.* The sounds of two adjacent letters, however, ran into each other, and an aspiration followed some of the consonants, so that instead of *papa* the word sounded *phaa-ph a;* these difficulties he contrived with much labour to surmount, and he found it necessary to imitate the human organs of speech by having only one mouth and one glottis. The mouth consisted of a funnel, or bell-shaped piece of elastic gum, which approximated by its physical properties to the softness and flexibility of the human organs. To the mouth-piece was added a nose made of two tin tubes, which communicated with the mouth. When both these tubes were open, and the mouth-piece closed, a perfect M was produced, and when one was closed and the other open, an N was sounded. M. Kempelen could have succeeded in obtaining the four letters D, G, K, T, but by using a P instead of them, and modifying the sound in a particular manner, he contrived to deceive the ear by a tolerable resemblance of these letters.

There seems to be no doubt that he at last was able to produce entire words and sentences, such as *opera*, *astronomy*, *Constantinopolis*, *vous etés mon ami*, *je vous aime de tout mon cœur*, *venez avec moi à Paris*, *Leopoldus secundus*, *Romanorum imperator semper Augustus*, &c.; but he never fitted up a speaking figure, and probably from being dissatisfied with the general result of his labours, he exhibited only to his private friends the effects of the apparatus, which was fitted up in the form of a box.

This box was rectangular, and about three feet long, and was placed upon a table, and covered with a cloth. When any particular word was mentioned by the company, M. Kempelen caused the machine to pronounce it, by introducing his hands beneath the cloth, and apparently giving motion to some parts of the apparatus. Mr. Thomas Collinson, who had seen this machine in London, mentions in a letter to Dr. Hutton, that he afterwards saw it at M. Kempelen's own house in Vienna, and that he then gave it the same word to be pronounced which he gave it in London, viz. the word *Exploitation*, which, he assures us, it again distinctly pronounced, with the French accent.

M. Kratzenstein seems to have been equally unsuccessful, for though he assured M. De Lalande, when he saw him in Paris in 1786, that he had made a machine which could speak pretty well, and though he showed him some of the apparatus by which it could sound the vowels, and even such syllables as *papa* and *mamma*, yet there is no reason to believe that he had accomplished more than this.

The labours of Kratzenstein and Kempelen have been recently pursued with great success by our ingenious countryman Mr. Willis, of Cambridge. In repeating Kempelen's experiment, shown in fig.

48, he used a shallower cavity, and found that he could entirely dispense with the introduction of the hand, and could obtain the whole series of vowels, by sliding a flat board over the mouth of the cavity. Mr. Willis then conceived the idea of adapting to the reed cylindrical tubes, whose length could be varied by sliding joints. When the tube was greatly less than the length of a stopped pipe in unison with the reed, it sounded I, and by increasing the length of the tube it gave E, A, O, and U, in succession. But, what was very unexpected, when the tube was so much lengthened as to be one and a half times the length of a stopped pipe in unison with the reed, the vowels began to be again sounded in an inverted order, viz. U, O, A, E, and then again in a direct order, I, E, A, O, U, when the length of the tube was equal to twice that of a stopped pipe in unison with the reed.

Some important discoveries have been recently made by M. Savart respecting the mechanism of the human voice,* and we have no doubt that before another century is completed a talking and a singing machine will be numbered among the conquests of science.

Watt's Machine for Copying Busts.

One of the most curious and important applications of machinery to the arts which has been suggested in modern times was made by the late Mr. Watt, in the construction of a machine for copying or reducing statues and sculpture of all kinds. The art of multiplying busts and statues, by casts in plaster of Paris, has been the means of diffusing a knowledge of this branch of the fine arts; but from the fragile nature of the material, the copies thus produced were unfit for exposure to the weather, and therefore ill calculated for ornamenting public buildings, or for perpetuating the memory of public achievements. A machine, therefore, which is capable of multiplying the labours of the sculptor in the durable materials of marble or of brass, was a desideratum of the highest value, and one which could have been expected only from a genius of the first order. During many years, Mr. Watt carried on his labours in secret, and he concealed even his intention of constructing such a machine. After he had made considerable progress in its execution, and had thought of securing his invention by a patent, he learned that an ingenious individual in his own neighbourhood had been long occupied in the same pursuit; and Mr. Watt informed me that he had every reason to believe that this gentleman was entirely ignorant of his labours. A proposal was then made that the two inventors should combine their talents, and secure their privilege by a joint patent; but Mr. Watt had experienced so frequently the fatal operation of our patent laws, that he saw many difficulties in the way of such an arrangement, and he was unwilling at his advanced age, to embark in a project so extensive, and which seemed to require for its successful prosecution all the ardour and ambition of a youthful mind.

[TO BE CONTINUED.]

See Edinburgh Journal of Science, No. viii. p. 200.

Notice to Correspondents.

Mr. J. L. Jennison, and Mr. J. L. Sullivan, will receive due attention in our July number. Those who think themselves in any way aggrieved by any thing which appears in our pages, shall always be heard through the same medium, however forcibly they may complain, provided always that due decorum is observed.

Meteorological Observations for March, 1833.

Moon.	Days.	Therm. Sun-rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	19°	24°	29.80	29.75	15°	NE.	Blustering.	0.32	Snow.
	2	15	20	.63	.80	--5	W.	do.		Clear—drifting.
	3	3	26	30.10	30.00	+1	W.	do.		Clear—cloudy.
	4	20	20	29.83	.00	--2	W.	do.		Clear day.
☺	5	17	27	30.26	.20	--2	W.	Moderate.		Clear—cloudy—snow in night.
	6	19	30	29.70	29.73	+13	NW. W.	do.	0.31	Snow—flying clouds.
	7	15	37	30.00	.90	18	W. SW.	do.		Light clouds—flying clouds.
	8	24	45	29.70	.60	34	E. SE.	do.		Cloudy day.
	9	29	40	.60	.60	23	NW. W.	do.		Scattering clouds—clear.
	10	30	35	.76	.80	27	WSW.SE.	do.		Cloudy—light clouds.
	11	28	42	30.00	30.10	33	NW. SE.	do.		Clear day.
	12	29	37	29.90	29.90	38	E.	do.	0.45	Cloudy—rain.
☾	13	31	40	.80	.82	20	NW.	do.		Clear day.
	14	20	45	30.00	30 10	14	NE. S.	do.		Clear day.
	15	31	44	.00	00	48	S. E.	do.		Cloudy—clear.
	16	30	45	.20	.26	23	NE. SE.	do.		Clear day.
	17	26	43	.30	.30	22	NE. SE.	do.		Clear day.
	18	32	52	.10	.05	42	SE. W.	Calm.		Cloudy—clear—rain in night.
	19	39	64	29.94	29.80	54	W.	do.	0.70	Rain—cloudy.
	20	51	59	.80	.80	59	S.	do.	0.02	Rain—cloudy.
⊗	21	56	64	.64	.60	57	S.	Blustering.		Cloudy day.
	22	49	57	.50	.50	37½	W.	do.		Flying clouds—cloudy.
	23	38	56	.80	.80	30	NW. S.	Moderate.		Clear day.
	24	36	62	.80	.70	38	SW.	do.		Foggy—lightly cloudy.
	25	42	53	.50	.50	37	NW. W.	do.		Cloudy—clear.
	26	32	45	.64	.66	20	NW. W.	Blustering.		Clear day.
	27	27	45	.90	.90	20	NW. W.	Moderate.		Clear—lightly cloudy.
☽	28	25	42	.95	.90	11	N.	do.		Clear—cloudy.
	29	26	44	.74	.70	11	NW.	do.		Cloudy day.
	30	30	48	.84	.90	15	W. NW.	Blustering.		Clear day.
	31	33	49	30.00	.93	24	W.	Moderate.		Clear day.
	Mean	29.10	43.39	29.86	29.86	24.6			1.80	

	Thermometer.	Barometer.
Maximum height during the month,	64. on 19th & 21st.	30.30 on 17th.
Minimum do. . . .	3. on 3d.	29.50 on 22nd & 25th.
Mean do. . . .	36.24 . .	29.86

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

JUNE, 1833.

On the Spring Safety Valves of the Boilers of Locomotive Engines.

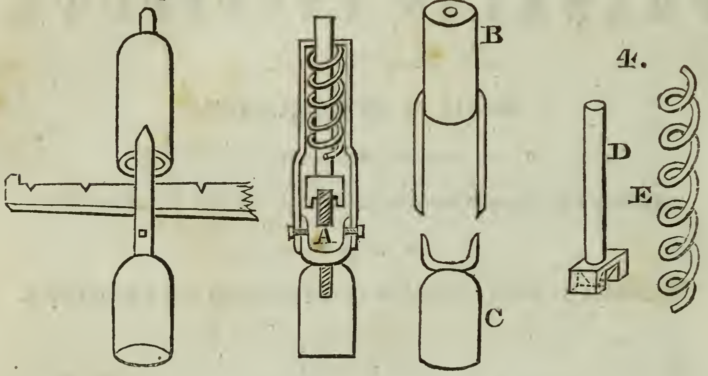
TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—

Observing that the improved *spring balances* are being brought into general use, for loading the safety valves of the boilers of locomotive engines, I will take the liberty of pointing out some of their defects, when applied to that purpose. In the first place, the apparatus permits the valve to be loaded to an unlimited degree, by screwing the nut until the index is drawn out to its full extent, the common method of attaching them to the lever being by means of a screw and adjusting nut. The facility with which the valve can be overloaded will prove, in the hands of careless or ignorant persons, a source of great danger. Secondly, when the steam is high enough to blow off, the load increases with the pressure of the steam; this was proved by an experiment with a safety valve, the lever of which was so proportioned that one pound at its end, gave ten pounds pressure on the valve. When the valve was closed, the index of the balance stood at 12 lbs., (the index moves through a space of about one-eighth of an inch for each pound,) and when the steam began to blow off, the index pointed to fourteen pounds; showing that there was an additional pressure of nearly 20 lbs. on the valve. It is well known that the use of the simple weight was laid aside on account of the tenden-

cy to batter the valve, and to permit the escape of steam, from the tremor of the carriage. I purpose now to suggest a plan which I think will not have the disadvantages just spoken of as belonging to the common weight, nor those before alluded to as affecting the spring weighing machine. It is illustrated by the following figures.

Fig. 1. 2. 3. 4.



In fig. 1 is shown part of the usual lever, with an *improved weight;* the apparatus is shown more completely by fig. 2, which is a cross section of fig. 1, in which A is the lever upon which rests a weight suspended by a spring. Fig. 3 shows a cylinder, B, or case, to contain a spring and stem, the latter having a hole in its top through which the stem works. C is the weight which is secured to the fork on the lower end of the case.

In fig. 4 the stem and saddle is shown in detail, and E is a spiral spring of steel; this is made to work freely between the inside of the case and stem, the upper end being fastened to the top of the case, and the lower to the pin on the stem.

Yours, respectfully,
A. C. J.

Note on the Properties of Silicon.

By Robert Hare, M. D. Professor of Chemistry in the University of Pennsylvania.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Since I enclosed to you my paper on the evolution of silicon, I have made the following observations. The silicon left

after repeated washings in cold water, and subsequent digestion in successive portions of boiling water, is, while moist, of a chocolate brown colour, but, by desiccation, this changes to a brownish ash, or to an ash with a very slight tinge of red.

Thus obtained, silicon does not appear to be acted upon either by sulphuric, nitric, muriatic, or fluoric, acid, nor by nitrate of potash when liquified by heat.

It seems to be soluble for the most part in a mixture of nitric and fluoric acids, which, by analogy, we may call nitro-fluoric acid; but after exposure for eighteen hours to this solvent, a small proportion of a black matter remained undissolved. This is, in all probability, carbon derived from the potassium, which, according to Berzelius, when obtained by Brunner's process, contains some combined carbon.

The solution in nitro-fluoric acid decanted from the residual black powder into a solution of pearlash, gave a copious white, gelatinous, precipitate like silex, which when thrown into a large quantity of water, subsided undissolved. When on subjecting the silicon to red hot nitrate of potash, an hydrous carbonate of the same alkali was added, so as to co-operate with the nitre, an explosive effervescence took place; all the silicon disappeared, and a compound resembling the silicate of potash was produced. This anomalous reaction may be considered as characteristic of silicon.

The impression that the black matter insoluble in the nitro-fluoric acid, was carbon, is confirmed by the fact, that after the silicon had been digested for some hours in strong nitric acid, and finally boiled in it to dryness, it dissolved in nitro-fluoric acid without any such residuum. As in the first instance, the resulting liquid when poured into a solution of subcarbonate of potash, gave a gelatinous precipitate.

You will perceive that these observations coincide, nearly, with those of the great chemist, to whom we owe the discovery of silicon.

FRANKLIN INSTITUTE.

Third Monthly Meeting for Conversation on Mechanical Subjects.

Mr. David Mason exhibited a diagram of a gauge contrived by him for determining the diameters of wheels, of any required number of teeth. By this instrument the mechanic is enabled to determine without the necessity of calculation, the diameter of a wheel of which the number of teeth is given. It is more general in its application than the scale now sometimes used for a similar purpose. The instrument will be, it is understood, submitted to the Committee on Inventions.

Mr. Franklin Peale exhibited and explained certain mechanical paradoxes. Questions growing out of the subject gave rise to a discussion in which many of the members took part.

There was placed upon one of the tables for the examination of the members a plough and grooving plane, by Mr. I. White, which attracted much attention from the neatness of the workmanship.

Mr. Fox explained, by reference to a model of the full size, a substitute for the common forcing pump, which he had recently patented; this supply apparatus is intended to keep the water of a boiler at a constant level, and to be self-acting. The difficulties encountered in practice in the use of the rotary supply cock, patented some months since, (see this Journal, vol. x. p. 160,) were stated without any reserve by Mr. Fox. He also spoke of an unsuccessful attempt to substitute a slide supply valve for the cock just alluded to. The evening was closed by the examination of the merits of the device of Mr. Fox, and a general discussion in relation to self-regulating apparatus, as means of safety to steam-boilers.

Bibliographical Notices.

Cabinet Cyclopedia. Mechanics by Capt. Henry Kater, V. Pres. R. S., &c. and the Rev. Dionesius Lardner, L. L. D., F. R. S., &c.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Having observed that your call for a review of the Mechanics of the Cabinet Cyclopedia has not been responded to, a student of mechanics would respectfully offer, in the absence of a more able commentator, a few remarks upon that part of the treatise to which he has referred. This undertaking might seem presumptuous, were it not that as the work is avowedly for the purpose of bringing a knowledge of the subject treated, within the reach of all grades of persons, a student but little versed in the subject, may, by his own difficulties, judge more accurately, perhaps, of the success of the author, than one who had a greater preliminary stock of knowledge. He proposes to consider, separately, a few of the most prominent chapters in the order in which they are given in the work itself, and to direct his observations, principally, to the manner in which the work, as a *popular treatise*, is executed.

The treatise begins, as indeed all treatises on mechanics should begin, with a statement of the principle of *inertia*. In this chapter there is simple language, and familiar, though convincing reasoning; in other words, the essence of true popularity in scientific writing. The examples are excellent: those throughout the book indeed with few exceptions deserve the same praise. If a student ventures to object that the rejection of the laws of motion of Newton has not simplified the subject, and that the argument is at least in one case, loose, it is that he finds himself backed by the authority of no less a man than Professor Whewell, of Cambridge, England.

Resolution of Force.—The examples under the head of composition and resolution of force are excellent; but in one of them a mistake has been pointed out to us. It is in the case of the boat urged by oars and tide. It is here supposed, first, that with no current the force of the oars is able in any time, say one hour, to impel the boat from a point on one side of the stream to another directly opposite; and then the distance which the force of the current, acting alone, would carry the boat in the same time being assigned, the diagonal direction being that actually taken, will, of course, conduct the boat to a point lower down than that directly opposite on the other side.

If the object then, says Dr. Lardner, be, from the *same starting point*, to reach this last point, the rowers must imagine one at such a distance above it, that the current could float the boat along that distance in the *same time* that the force of the oars, acting alone, would require, to impel the boat from the starting to the imaginary point.—But it seems plain that this time cannot be the *same*. For the distance between these last two points being greater than that between the two opposite points, will require a greater time to be passed over with the same moving force; and before this time, then, has elapsed, the boat will have come opposite in the stream to its true point of destination; to attain which in the same time (one hour in this case) in the way directed to be pursued, would require that the opposite bank should come nearer. It is plain that to reach the true landing place in the *same time*, the rowers must carry their boat to another starting place higher up the stream, and easily determined.

Attraction of Gravitation.—More definite ideas than are always found on this subject, might be communicated, we think, by stating distinctly that the attractive force between any two (or more) bodies is one and the same in quantity; so that the tendency of either body towards the other is, in all cases, equal to that of the other towards it. It will be easily understood, then, that any increase or diminution of the mass of either, will not be attended with any alteration of its own velocity, since the corresponding alteration of force is shown in the first case by the motion of a larger, and in the second by the motion of a smaller mass with the same velocity; but the mass of the other body not being altered, any alteration of the moving force acting on it, can be shown only by a corresponding alteration in the velocity of its motion. It will be further understood, with ease, that they must then *meet* at a point as much nearer the larger body than the midway point, as the mass of the larger exceeds that of the smaller, since the velocity of either is invariably as its mass.

Terrestrial Gravity.—The chapter with this title is an example of a completely successful application of reasoning which all can understand, to the analysis of complicated phenomena: it shows how far a *truly* popular work can go into the heart of science. Some parts might have been more quickly comprehended, had the train of reasoning been drawn out a little further. But we say only *more quickly:* a second perusal is equivalent.

Centrifugal Force.—It is to be regretted that a more exact analysis of this most important subject has not been presented in the present work, particularly as greater facility of comprehension would have been the immediate consequence to the reader. The primary derivation of the idea is good. "There is, however, another cause which produces a pressure upon the curve, and which has no operation in the case of the inclined plane. By the property of inertia, when a body is put in motion in any direction, it must persevere in that direction unless it be deflected from it by an efficient force. In the motion down an inclined plane, the direction is never changed, and, therefore, by its inertia the falling body retains all the motion impressed upon it, continually, in the same direction; but when it descends upon a curve, its direction is constantly varying, and the resistance of the curve, being the deflecting cause, the curve must sustain a pressure equal to that force which would thus be capable of continually deflecting the body from the rectilinear direction in which it would move in virtue of its inertia. This pressure entirely depends upon the curvature of the path in which the body is constrained to move, and on its inertia, and is therefore altogether independent of the weight, and would, in fact, exist, if the weight were without effect."—p. 83.

Then succeeds the following sentence, before the introduction of which, what is evidently wanted is an application of the resolution of force.

"This pressure has been denominated *centrifugal force*, because it evinces a tendency of the *moving* body to *fly from the centre* of the curve in which it is moved."

The resolution of force is wanting here to determine not only the quantity of this pressure, but also its actual *direction*. If the theory of the resolution of force be studied, it will indeed be plain that this direction must be, at any point, perpendicular to the curve, the other element of the moving force acting in the direction of the curve; but those who for the first time view a subject, particularly if they be ordinary readers, are not apt to regard it in this elementary way.

The law of the variation of this pressure, or centrifugal force with the velocity of the moving body, and the curvature of its path, is simply stated, without any development of the reasons why it should be expected to hold. "To estimate the rate at which this pressure in general varies, it is necessary to multiply the square of the number expressing the angular velocity by that which expresses the radius of curvature, and the force increases in the same proportion as the product thus obtained."—p. 84. Yet this law seems to admit of a simple derivation by the aid of the reasoning employed in this and other chapters.

Taking first the radius of curvature to be the same, then the centrifugal force must increase with the variation of the path of the body in any given time, and with its momentum, (and may, therefore, be represented by the product of the numbers expressing these.) For by the application of the resolution of force it will easily appear, that

the greater, in any given time, the deflection of the body from its path by the resistance of the curve, the greater the pressure against the curve; and that with every increase of momentum of the body in the direction of its motion at each instant, (i. e. in the *tangential* direction,) its momentum in each element of that direction, and, therefore, in the centrifugal direction, will be proportionally increased. Now, the deflection is measured by the circular arc, or, in other words, the *space* gone over in a *given time*, and this again measures the *velocity* of the body's motion; and momentum is represented by the product of the mass of the body moving, multiplied by its *velocity*. The product, then, of the mass of the body, by the *square* of its velocity, may be substituted for the first expression, to represent the centrifugal force.

As we now refer to one and the same curve, the actual velocity of the body may be represented by, or rather is identical with, the angular velocity, which is therefore substituted for it as a more convenient and manageable term. But when the lengths of the radii of the circles of curvature vary, angular velocity is no longer a measure of actual velocity, since the actual length of arcs subtending the same angle increase in proportion to their distance from the angular points. To make angular velocity, in this case, a measure of actual velocity, the length of the radius must, then, be taken into account, and we must multiply the square of the angular velocity by the radius of curvature, in order to get the expression for the centrifugal force, as it depends upon velocity and curvature; and this product again by the mass, to obtain one for the total centrifugal force.

It has been the object of the writer, in these remarks, to show, in a general way, how this law of the variation of centrifugal force, with the velocity, &c., might be made out to the popular reader, with sufficient exactness for his purpose.

The representation of centrifugal force, as a pressure necessarily exerted by a body moving on the inner surface of a hollow sphere, against that surface, is perhaps the most popular form in which the idea can be presented, and if the forces in action be well presented and distinguished, seems to be equally accurate.

The author is not perhaps as happy in the choice of one or two of his examples on this subject, as he usually is. The stone whirled by the hand, in a sling, in a direction perpendicular to the ground, and which "will not fall out of the sling, even when it is *at the top of its circuit*," is a clear and impressive example; for at the top of the circuit, gravity, acting as it then does in the direction of the string and hand, may be considered as the force which retains the stone in its orbit, (although, of course, it is the muscular force of the hand, and the cohesion of the parts of the string, which really do this;) and it is then directly opposed to the centrifugal force. But the glass of water, "whirled so rapidly, that even when the mouth is presented downwards, the water will still be retained in it by the centrifugal force," does not appear to us to be so fortunate. There are too many forces, and too many directions, to be put without comment into the

hands of a reader, immediately after the first elementary exposition of the force under illustration.

Centre of Gravity.—The manner in which the idea of the centre of gravity is derived, by first obtaining a single force which is equivalent in value and direction to the sum of the forces acting on all the particles of a mass, and then showing that the direction of this force must always pass through *one point* in a body, whatever be the position of the latter, is unrivalled for clearness and simplicity. To take an example of the effect of this method of explaining the subject; every reader must at once perceive that this equivalent force must be met, in order to produce an equilibrium, by another (equal in value) acting in the same line of direction, but opposed to it. But how to determine the actual direction out of the many parallel ones that may be chosen? The *position of the centre of gravity* determines this, for the line of direction must pass through that one point. The advantage of giving a reader this natural synthetical way of getting at the subject must be obvious.

The examples in this chapter are excellent. The use of the flexibility of the knee joint in lessening the labour of walking, is one, but as a consideration of the motion of the centre of gravity is not *necessary* here, (for all must see that with a wooden leg, the whole weight of the body must be partially elevated,) not as good a one in its place, perhaps, as some others.

Mechanical Properties of an Axis.—This appears to a student to be the worst chapter in the book, (of those belonging to Dr. Lardner.) He speaks solely in reference to the *design* of the work as a popular treatise. The only part of it which appears intimately connected with the other parts of the subject is that which relates to the "moment round an axis," and to the "moment of inertia," and is unfortunately crowded in, among a mixture of facts and partial reasonings which few readers, he thinks, would be likely to understand or remember, as they are there presented.

The Pendulum.—The centre of oscillation is very well derived. Much of the true popularity of this kind of writing consists in giving a clear idea of the meaning of such expressions as this, and particularly of the utility there is in conceiving the existence of such imaginary *loci.* We noted above how clearly this is done with respect to the centre of gravity.

Watch and Clock Work.—There is some confusion on this subject, and a general view of the works of a common watch is given in the figure marked 111 (bis) without any fusee.

The manner in which time is divided into small equal parts by clocks and watches, is calculated to convey a good idea of the various kinds of motion. When weights are used, as in stationary clocks, the uniformly accelerating force of gravity is the moving power, and all that is wanted to make the weight and the hands, which it finally turns, describe equal spaces in equal portions of time, is a contrivance to stop the uniform acceleration at each instant, which is done by the pallets of the escapement wheels moved by the pendulum. But in portable chronometers, watches, and the small pendulum time pieces,

such as usually stand on mantle pieces—the moving power being the elastic force of a spring in the act of unwinding itself, and therefore not in a state of *uniform* tension, is a force which, though constantly applied, and therefore accelerative, is not uniform in power, and therefore not uniformly accelerative. The first step here in the process of procuring equal divisions of time, is therefore to reduce this unequally accelerating force to one uniformly accelerating; which is effected by the fusee. The second is the same which is done in the standing clock, viz. to stop the uniform acceleration at each instant. In watches and portable chronometers, the pallets of an escapement wheel, moved by the balance wheel, (which is kept in a state of vibration by the hair spring,) performs this work, and in the small mantel time-pieces a pendulum.

The Pulley.—There are three divisions of the mechanic powers given in this work, viz. the lever, the cord, and the inclined plane. The second of these, the cord, includes all those cases in which force is transmitted by means of flexible threads, ropes, or chains, and therefore embraces the pulley. As the principle by which the mechanical efficacy of these machines is determined was new to the student,* he will attempt a very short analysis of its application in a few of the principal cases.

This principle is simply the following: that "from the definition of a flexible cord, *its tension, or the force by which it is stretched, throughout its entire length, must be uniform;* or, in other words, that the *force by which it is stretched, must, throughout its entire length, be the same.*"

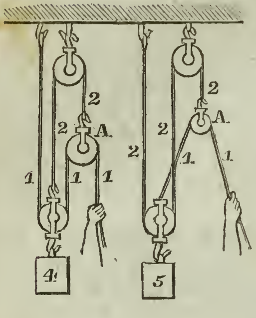
In the fixed pulley, the weight must, by this principle of tension, produce the same tension in every part of the cord, and therefore the same in that part to which the power is applied, as in any other. But the part of the cord to which the weight is attached is stretched by the whole weight of the latter, and, therefore, the weight must produce a tension at that part of the cord at which the power acts equal in force to its own weight, which tension must be met, in order to produce an equilibrium, by an equal opposing force in the power. Hence the power and the weight are, in this machine, equal. The block and sheave, it must be observed, evidently support the united tensions of power and weight.

In the single moveable pulley, the tension produced by the weight must, by the principle of tension, produce an equal tension at the fixed end of the cord, and at that to which the power is applied; and the fixed support and the power must, therefore, be equally engaged in supporting the weight; a weight will therefore be supported equal in force to twice the power. 1 to 2 will then be the ratio of power to weight in this pulley.

We have space only to show the application of the same principle

* The same method had previously appeared in the Treatise on Mechanics in the Library of Useful Knowledge, understood to be the work of Dr. Lardner.

to one or two of the pulleys with more than one rope, and shall for this purpose select the Spanish burton. We must employ a figure.



Taking up these instruments in order: in the first of them the rope to which the power is attached must, by the principle of tension, be stretched equally by the weight in every part, and must, therefore, suffer the same tension from the weight at the fixed end, and at that to which the power is applied. The fixed support and the power must, then, be equally engaged in supporting the weight. This rope alone considered, then, the ratio of power to weight in order to produce equilibrium, must be 1 to 2. But the block A is in the same situation with that in the fixed pulley, and must, therefore, sustain the united tensions of the power and that part of the weight which it supports; or, in other words, a tension equal to *twice* the power. This tension being communicated to the second rope, must be met, in order to produce an equilibrium, by an equal force in the weight: the number 2 must then be added to that found above, and 1 to 4 will be the true ratio of power to weight.

In the second of these pulleys, the rope to which the power is attached, being in the state of a fixed pulley, by means of it, a part of the weight just equal to the power will be supported by the power; and, this rope alone considered, the ratio of power to weight, in order to produce equilibrium, would be 1 to 1. But the block A being in the situation of the corresponding block in the first burton, sustains the united tensions of the power and that part of the weight which the power supports by the first rope; which tension is equal to *twice* the power. This being communicated to the second rope, must be met in order to produce equilibrium by an equal force in the weight. But by the principle of tension, both the fixed end of the second rope and that at A must be equally stretched; the fixed support and the force acting at A, equal to 2 (*twice* the power,) must then be *equally engaged* in supporting the weight, and will, therefore, both together, support a part of the weight equal to 4. This number being added to 1, which gave the ratio of weight by the first rope, gives 5 for the real value of the weight in terms of the power 1, in the case of equilibrium.

A student believes that he has thus presented an exact specimen of the application of the *principle of tension* to a few of the principal cases. The author is not, he thinks, in the present work, as clear in his analysis of the subject as in that presented by him in the Library of Useful Knowledge.

A Student.

The Elements of the Differential Calculus; comprehending the general theory of curve surfaces and of curves of double curvatures; intended for the use of mathematical students in schools and universities. By J. R. Young, *author of "The Elements of Analytical Geometry," revised and corrected by* Michael O'Shannessy, A. M.

We congratulate the lovers of mathematical science on the appearance of the above work. Mr. Young's treatise on algebra had raised high expectations; these have been fully realized in his work on the elements of the differential calculus, and we look forward with deep interest to the other treatises announced from the same gifted pen.

A complete work on the differential calculus has long been wanted in this country; we are glad to learn that even in England such a treatise is received with favour, we see in it nothing of *fluents* and *fluxions;* the doctrine that increase and diminution require motion is studiously avoided.

The writer of this notice recollects well the time when, at one of the most ancient and best endowed universities in the union, he was desirous of studying the differential and integral calculus, he applied to the professor of mathematics for advice, and was informed by him that no book on this subject had been published here—that if he wished to cultivate the subject he would do well to study Euler's treatise on the calculus of infinitesimal quantities. In consequence of this suggestion he procured Euler's Treatise, consisting of near eight hundred pages, in the Latin language, and after a laborious perusal of the works, he learned that it treated of quantities which were at the same time equal to 0, and greater than 0, or less than 0—that one quantity infinitely great might be an infinite number of times greater or less than another quantity also infinitely great—that quantities infinitely small were equal to 0, that an infinite number of such quantities might have a finite value greater than 0. Perplexed with this metaphysical view of the subject, he concluded, in the language of Lear, that "nothing can come from nothing," and abandoned the study in despair. The subsequent publication of Bezout's treatise on the differential and integral calculus, a beautiful piece of composition, but too concise to do full justice to the subject, afforded encouragement for a renewal of the study. These remarks have been made to show what advantages for the study of higher mathematics were furnished in our universities ten years ago. The want of fit text books, and of competent teachers, threw a langour over the efforts of the students. No science can have many votaries in any country so long as its rudiments are locked up in a foreign language:—it is only by dissemination of publications in our native tongue, we will even say of books printed on this side of the Atlantic, that the study of higher mathematics, or indeed of any of the sciences of which the list has of late years been so widely extended, can be made to flourish

and engage the interest of the mass of aspirants for distinction in the different universities and colleges throughout the country.

Our enterprising booksellers, Messrs. Carey, Lea, & Blanchard, have removed this inconvenience by placing before the American public two of the best treatises in their several departments with which we are acquainted. Of the algebra it may be said that it is more complete than any to which we had access before; of the calculus we must say that it is indispensable, it is the only key which is furnished us by the American press for the interpretation of works in the higher departments of mathematics. We believe that this work contains all that can be desired on the subject of the differential calculus, and, if followed by as good treatises on the integral calculus, on geometry, and the application of algebra to geometry, will furnish the student who shall peruse them attentively, with all the previous knowledge requisite for commencing the highest department of mathematics, that of analytical and celestial mechanics.

Perhaps the student for whose perusal this book is offered will inquire whether the calculus, as here illustrated, is easily comprehended? Has Mr. Young succeeded in making this study more popular than his predecessors have done? We will inform him that the subject is here made as simple and as popular as its nature admits. An easier treatise might have been made, but when studied with the utmost care, it would have left the student in ignorance of many important principles which this book illustrates, and without which further progress in pure mathematics would have been very inconvenient. We could have wished for a few more practical examples, though even in this respect the author has the advantage of all who preceded him. The great fault of former works on this subject, in our opinion, has been the want of examples for the exercise of the active powers of the learner. This defect is common to all new studies: the storehouse of practical questions has never been filled. The precepts have been given, and the learner has been left to illustrate them in his own way.

Mr. Young's book contains many new and ingenious solutions, and a good number—we wish it had been greater—of questions without solutions. On these the student will have ample opportunity for the exercise of his own ingenuity. If he is desirous of solving more examples, we would refer him to the formulas and problems of Meier Hirsch, which have lately been translated into English, and published in this country. For those who are not fond of making original solutions, but are willing to peruse the solutions of others, and thus become acquainted with the literature of mathematics, this beautiful treatise will afford a rich fund of information, and will amply reward their labours.

S. C. W.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN DECEMBER, 1832.

With Remarks and Exemplifications, by the Editor.

1. For *Bungs for Porter and other Casks;* Robert Barlow, city of Philadelphia, December 1.

This bung is to be made of cast iron, and in the top of it there is to be a dovetailed mortise, into which three pieces of iron are to fit, and to be connected by means of a ring and bolt, exactly like the Lewis for raising heavy stones. By means of this ring, through which a lever is to be passed, the bung may be readily drawn. The claim is to the iron bung, and the application of the dovetail pieces above described.

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2. For *Making Wine from Apples and other fruit;* Jacob Hugus, Hempfield, Westmoreland county, Pennsylvania, December 1.

This is not the first time we have heard about making wine out of cider. A negro belonging to a wine merchant in Philadelphia, once observed, that he was sure his master would soon break, and on being urged to tell the reason, he replied that he laid out almost all his money for cider, and never sold a drop. Notwithstanding this, however, the merchant grew rich.

The patent before us is for preserving cider, and the juices of other fruits, and converting them into wine, by the means of a "quintessence" which will prevent them from becoming acid. This *quintessence* is to be obtained from apple brandy, or rye whiskey, by distilling it until its proof is so high that ten gallons of it will require seven or eight of water to bring it to first proof. Into every barrel of the cider as much of this quintessence is to be put as would make five gallons of proof spirit, and a little more may be added after a year or two—"when the sap rises and the trees are in bloom." "The cider must be made in the decrease of the moon;" there are, besides this, several other lunarian influences, which appear to have governed the author of these new inventions and discoveries, as they are set forth in several parts of his specification. To his discoveries and improvements he lays no claim.

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3. For a *Percussion Primer for Cannon;* Joshua Shaw, city of Philadelphia, December 3.

(See specification.)

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4. For a *Compression Cannon Lock;* Joshua Shaw, city of Philadelphia, December 3.

(See specification.)

5. For a *Portable Cannon Lock;* Joshua Shaw, city of Philadelphia, December 3.

(See specification.)

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6. For an improvement in *Casting Iron Hubs* for Wheels; John Thurston, Providence, Rhode Island, December 3.

The improvement claimed consists in making a perfectly true and smooth core of iron to form the box. Upon this the hub is to be cast, and removed from the mould whilst hot, when the core may be driven out by striking it on the small end. The patentee says that he is aware that metallic cores have been used in small castings, and that he claims as new only the application and use of them in casting wheel hubs; ought we not to be informed at what size his patent begins to take effect?

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7. For a *Plough and Harrow;* Henry Higley, Canaan, Litchfield county, Connecticut, December 4.

This plough and harrow is made in the usual form of the instrument sometimes called a cultivator; it has a coulter at its front angle, formed much like the teeth of some of these instruments, with a ridge along its centre, to turn the earth on either side. The teeth on the two side bars of the V are straight, like those of common harrow teeth.

The claim to the foregoing machine is "in the using this share as described, and the combination of the whole as uniting the properties of the plough and harrow.

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8. For *Machinery for Cleaning Fur;* Charles Lockwood and Ransom Lockwood, of Weston, and John Arnold, of Norwalk, Fairfield county, Connecticut, December 4.

It always affords us real gratification when we meet with an apparently good machine so described as to be likely to secure to the inventor his rights, and such appears to be the case with that before us. The object in view is to separate the fur and hair from each other after they have been cut from the pelt. A machine is described which the patentees say they have had in use with beneficial results, and they indicate different modes in which the same principle may be applied, resting their claim upon the principle of action, whether applied as they have done it, or in any analogous way, which produces the same effect.

The invention is founded on the principle that the barbs, or asperities, contained on hair, give to it a tendency, when agitated, to travel back in such a way as will cause it to enter between the fibres of any kind of cloth, and to pass through it. A principle, in fact upon which the process of felting is entirely dependent.

The machine which they use is an oblong box, supported on a suitable frame, the sides of the box are lined with tin, or otherwise so made that the fur will not adhere to it, whilst the bottom is made of cloth, into which the hairs are to be forced to pass. Within this box re-

volve a number of whippers, attached to shafts, which serve to agitate the fur, keep it hollow, and prevent it felting. The machinery by which the shafts are turned operates also upon the cloth bottom by a kind of twitching motion, alternately relaxing and straining it, which causes the hairs to enter and pass through it.

It is proposed sometimes to send the fur through a revolving machine, formed like the boulter of a flour mill, and covered with cloth, having whippers revolving in it, and beaters acting upon the outside of it, in order to produce a result analogous to that obtained from the twitching motion before spoken of. Other modes are pointed out, all of which are considered as mere examples of the many forms which may be given to the apparatus, whilst it remains essentially the same, the claim being to "the agitating in any manner the mixed mass of fur and hair, and causing their separation by the inherent and natural qualities of the hair when thus agitated in contact with the cloth."

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9. For a *Lamp for burning Tallow, Lard, Beeswax, or other concrete oils;* Norman Rublee, Montpelier, Washington county, Vermont, December 4.

It is proposed to make the body of this lamp in the form of a common tumbler, with the cover, or upper part of it, convex. Tubes with wicks are fixed in its centre in the ordinary way, and within the body of the lamp there is a cup which is open at top, and may be about half the height of the shell, or external case of the lamp. This cup is borne up by a spiral spring, so that its upper edge is kept in contact with the cover of the lamp; from the centre of this cup a wire, which may be of copper, ascends and passes through a hole in the centre of the burner to which the tubes are attached; this wire is to rise so high that the flame of the wicks may heat it, which heat descending down melts the concrete matter, being aided also by that portion which it communicates to the cup and wire spring to which it is attached.

When the lamp is to be filled, the wax, tallow, &c. in a melted state, is to be poured into it, so as not only to fill the cup, but the body of the lamp also. When the material is partly burnt out, and becomes too low in the cup to supply the wick, the wire heater is to be pressed, which, causing the cup to descend, will again fill it, and, when the pressure is removed, the action of the spiral spring will restore it to its place.

The points depended on "are the construction of the cup, spring, and heater," by which "the great difficulty of the tallow's getting low, and beyond the influence of the heat, is avoided." This combination we believe to be new, although the heater alone is not so, a copper, or other wire, having been frequently used to keep tallow, &c. in a melted state for burning in lamps.

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10. For a *Cock to prevent Water from Freezing* in a Pentstock, or Branch Pipe; Dixwell Lathrop, jr., Norwich, New London county, Connecticut, December 6.

This invention, like the last, is very well described; but unfortu-

nately for the patentee, if he is a *true*, he is far, very far, from being the *first* inventor of the thing described; we do not suppose that it is "as old as the hills," but it was a familiar acquaintance of ours thirty years ago, at least; we had it then in use in Philadelphia, as had hundreds of others.

The object of the contrivance is to let off the water which would otherwise freeze, in an ascending pipe; and this is effected by means of a cock placed sufficiently low in the supply pipe to be out of the reach of frost. To those of our readers who are not acquainted with the thing, the following description may be acceptable. Suppose a waste-cock to be placed sufficiently low down in the supply tube, and the key to be so turned as to allow the water to pass through it, and, while it is in this position, a hole be drilled through the side of the cock, and into the water way of the key; if you then turn the key half way round, the water will pass freely as before, and the drilled hole through the key being against the imperforated side of the cock, no water will escape through it; but if you then turn the key one quarter round, so as to present the hole drilled in it to the rising pipe, the cock will be turned off, and the water in the rising pipe will escape through the drilled hole into the water way of the key, and out of the drilled hole in the body, or shell, of the cock. This water may be thence conducted through a descending waste pipe into the ground, or elsewhere.

From the arrangement above described the patentee has not departed in the slightest particular.

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11. For *Machinery for making Window Sashes, &c.;* Charles Thompson, Poughkeepsie, Dutchess county, New York. First patented December 6th, 1830. Surrendered and reissued on an amended specification, December 6th, 1832.

When this machinery was first patented, a model was prepared showing in detail its various parts; but the distinct instruments by which the various operations were performed were so placed as to obscure each other; from this model a drawing was made in one point of view only; the references to it could not, therefore, afford a sufficiently clear explanation of the whole; the claims, also, were not clearly presented. To cure these defects, was the object of the amended specification.

This is not the first machine invented for the same purpose, but we are of opinion that it is the best. We are informed that it has been in actual operation for a considerable length of time, with results which are perfectly satisfactory. It would be in vain to attempt a lucid description of it without several engravings.

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12. For a *Cooking Stove;* Henry A. Foot, Dover, Strafford county, New Hampshire, December 7.

We cannot supply the hiatus left by the patentee in his specification, in which he has not made any attempt at pointing out the no-

velties of his apparatus. There probably may not be another stove with the corners rounded to the same circle, or the partitions and openings for pots and kettles arranged precisely in the same way, and that is all we can say for it. We hope that the heat which it affords may greatly transcend that of the light diffused by the specification or description of it.

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13. For an improvement in the *Machine for preparing Cotton Roving;* John A. Bradshaw, Foxborough, Norfolk county, Massachusetts, December 8.

Without the drawings we cannot give a clear idea of the proposed novelty, which consists in the application of a spring to the flyer, in such a way, and so constructed, as to give a slight degree of twist and condensation to the roving; a purpose which persons acquainted with the subject are aware has been accomplished in various ways.

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14. For *Glass Hones for Razors, &c.;* A. Gordon, and John P. Bakewell, Pittsburgh, Allegheny county, Pennsylvania, December 8.

Such a form is to be given to rods of glass as may be deemed best, a convex surface, however, being preferred to a flat one. The faces of the glass hone are to be "rough, ground, or frosted, by any of the usual means, and a grain differing in fineness may be given to the respective sides." Upon the glass hone, so prepared, the razor is to be rubbed in the usual way, the hone being first moistened with water or oil. The claim is to the application of a new material, glass, to the making of hones. A slight trial, upon a roughened glass tube, afforded us a very favourable result.

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15. For a *Thrashing Machine;* Jesse Bevier, Sempronius, Cayuga county, New York, December 11.

This thrashing machine is to be used not only for thrashing grain, but also for grinding [or hackling] apples. There are to be bars and spikes on a cylinder, and bars and spikes on a concave, and the improvement claimed is "the bars and spikes of the cylinder acting upon the grain over the concave of bars, and over and between the spikes in the concave at the same time; and also the application of the machine to grinding apples."

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16. For an improvement in the *Water Wheel;* James M'Connel, Shenango, Mercer county, Pennsylvania, December 13.

The patentee claims, in the action of his wheel, the conjoint operation of three powers, all derived from the descent of the water; it is to be a horizontal, reaction wheel, receiving the water on its upper, and discharging it on its lower side. There are to be eleven buckets, extending from the periphery of the wheel towards its centre, about one-half the semidiameter; the buckets are to be curved from the top to the bottom in such a way as to deliver the water advantageously in its exit. The wheel is, of course, to run in a penstock, with a

suitable curbing, to direct the water. The buckets overlap about six inches, at their outer ends, that is, a line drawn perpendicularly from the lower edge of one bucket, would cut off about six inches of the contiguous bucket. Not only the number of the floats or buckets, but the precise dimensions of every part, are given; a detail into which it is not necessary for us to enter.

We are told that this wheel will run in back water with more facility than any other, and that it is particularly adapted to places where the head is low, and the wheel liable to be flooded. The three powers which act upon it are thus set forth by the patentee; he says that the water issuing from the bottom of the wheel propels it upon the principle of reaction; that the water being let on at the upper side, and running with the wheel, and striking the buckets nearly at right angles, propels it upon the principle of percussion; and that the water in passing down through the wheel, acting on the inclined surface of the buckets, gives a third impulse on the principle of gravity. The claim is to the practical combination of these three principles of percussion, gravity, and reaction, used at one and the same time.

We are unable to trace the particular and special coadjutorship of these three principles in this wheel, and could as readily ascribe them to several others; we are, however, so much inclined to resolve all these modes of action into gravity, and to view them as merely different methods of applying this property of matter, as not to acknowledge the employment of any other power in the propelling of water wheels. Reaction and percussion we esteem as the children of gravitation, and would never commend their employment when the fall of water is sufficient in height to enable the millwright to fill the buckets of an overshot, or pitch-back wheel; that is, when it is necessary to husband power.

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17. For improvements in *Abstracting heat from the smoke of air heaters, and of applying basket grates to such heaters;* Daniel Steinhauer, city of Philadelphia, an alien, who has resided two years in the United States. December 13.

(See specification.)

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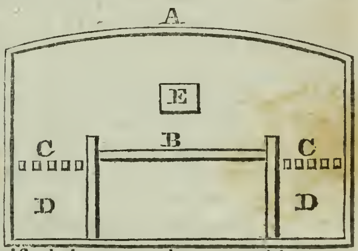
18. For *Making and manufacturing Iron by the use of anthracite or stone coal, and for a Furnace used therefor;* Norman Callender, Iron Master, Cumberland county, Pennsylvania, December 14.

The inventor of the furnace described in the specification of this patent, represents it as applicable to the manufacturing of sheet, boiler, rod, hoop, and bar iron of all descriptions, and also to the melting of iron for making castings of all kinds. The furnace is to be nine feet long, and three wide; the chamber between the fires, however, is widened out in the centre to nearly four feet, by the curvature of the side walls. For sustaining the fuel there is a grate at each end of the furnace, extending across it, and occupying two feet of its length. Beside each grate a wing wall is extended across, like those in the

ordinary air furnace. Under each grate there is an air chamber, eighteen inches in height, and air is to be forced into these in the usual way, which being diffused through the chamber, acts with equal power on every part of the fuel upon the grates; these air chambers answer the purpose of ash pits. The roof is an arch, sprung from the ends, with a rise of six inches. The various openings into the furnace must be adapted to the purpose for which it is to be employed; the heating of sheet iron, for example, requiring a wider opening than either of the other objects.

The patentee claims the use of anthracite in the manufacturing of iron, as above, through all its stages, from pig to bar iron, in all its variety of forms and descriptions; and also the melting of cast iron for foundry purposes, without bringing the coal into contact with the iron. He claims, likewise, the furnace as above described, to be used in, and applied to, the said purpose.

The subjoined sketch will give some idea of the form of the furnace, A being the roof; B the floor, C C the grates; D the air chambers, and E the charging door. The peculiarities of this furnace are undoubtedly the proper subject of a patent, but the broad claim which is made to the exclusive right to the employment of anthracite in the various operations specified, is scarcely one which can be sustained, as this same fuel has been already and extensively employed for some of the purposes named, and its application to the others frequently essayed.



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19. For a *Process of manufacturing, and dyeing with, the Alkaline Prussiates;* Felix Fossard, of the city of Philadelphia, an alien, who has declared his intention to become a citizen of the United States. December 14.

(For account of this patent see page 182.)

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20. For a *Machine to be used in the art of Blowing Glass;* Joshua Laird, Pittsburgh, Allegheny county, Pennsylvania, December 14.

The machine above named is intended for blowing glass knobs for bureaus, and other detached pieces of glass, which are blown in moulds; the main part of the invention consists in the application of a forcing, or condensing, pump, to the blowing of articles of the foregoing description. A table of a suitable height, has a top formed of a plate of cast iron, upon which are proper fixtures for sustaining the mould into which the detached piece of glass is placed. The cylinder of the pump is secured vertically at one end of the table, and the air from it is conveyed through a leaden, or other flexible, pipe, to a hole the centre of the table, exactly under the mouth of the mould; a

pipe, or nozzle, of brass, or other metal, attached to the flexible tube, passes up into the glass to be blown, and is retracted when the operation is completed, it being attached to a jointed handle, fixed for the purpose below the table. The mould, and its handles, are made in the usual way, excepting a cap plate, attached to the table, and which turns back upon a joint, when the mould is to be removed. The centre of the under side of this plate is excavated so as to form the upper part of the mould, and is perforated so as to admit a pin to pierce the knob.

The claim is to the application of the pump in the blowing of glass, and to the crown, or cap piece, as above described.

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21. For a *Back for a Forge*, or other fires in which a blast is used; Asa Graham, Hamilton, Madison county, New York, December 15.

This *improvement* in the backs of forges we think very inferior to that described at p. 165, vol. x. A cast iron box is to be made, one face of which is to form the back of the forge; from the lower side of this the tuyere, cast in one piece with the plate, is to project. The wind is to be blown into this box through a tube on the opposite side, and near its upper edge. This, we are informed, is more simple than the box with an intermediate plate, such as is described in the article above alluded to, which it must be confessed is perfectly true, but, at the same time, we apprehend that the simplicity is attained at the expense of utility, and that its adoption is proposed without an adequate acquaintance with the principles upon which the efficiency of a blast depends. In the arrangement now proposed, the air will be less heated, and consequently, the front plate less cooled than in the former arrangement; now it has been found that the efficiency of a blast depends in a great degree upon the heat of the air introduced among the fuel, and that an important modern improvement in blast furnaces consists in heating the air highly before it is admitted among the fuel; for some facts on this point the reader may turn to vol. x. p. 130.

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22. For an improved *Water Wheel;* Sandford Reynolds, Pitcher, Chenango county, New York, December 15.

We do not fully understand the description of this wheel, although it is accompanied by a drawing better executed than many which pass in the patent office. It is termed, on the head of the drawing, a *Coaction-wheel*, and we suppose that, like No. 16, it is to be coacted upon by gravity, impulse, and reaction. A vertical cylinder, surrounded by buckets, which appear to form radii with it, runs in a hollow cylinder, which has four openings in it directing the water tangentially on the wheel, and thus propelling it. The buckets, we are told, are to be curved, but whether this is for the purpose of giving them a helical twist upon the cylinder, we do not know. There is no claim made.

23. For a *Cooking Stove;* Henry Stanley, Poultney, Rutland county, Vermont, December 17.

The part of this stove which is to contain the fuel is of a square form, and made of cast iron. Instead of the kind of top usually employed there is to be a circular plate of such size that only about one-third of its area will lie over the fire chamber, or body of the stove, the remaining two-thirds projecting beyond it. This is covered by a second plate, supported by a rim, which rises it from the first circular plate. By means of cogs upon the edges of the upper plate, it may be turned round, whilst the lower plate remains stationary, a pinion and crank being fixed for that purpose. A chamber, for smoke and heated air, exists between the two plates; and these are conducted off through an opening in the lower plate and in the rim. The upper plate is perforated to receive pots, kettles, and other cooking apparatus, and a large tin cover, operating as a reflector, is provided to cap the climax. The claim is to the revolving top plate for receiving the various cooking fixtures.

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24. For a *Fanning Mill;* John W. Hunter, Morgan L. Hunt, and Sullivan Holman, the two former of Oakland, and the latter of Senacoe county, Michigan Territory, December 18.

The three gentlemen to whom this patent has been granted, have, it seems, invented, or contrived, something new in the mode of shaking the screen and sieves of the ordinary fanning mill. The manner of doing this is described at great length, but the accompanying drawing presents nothing more than an external view of the instrument, without written references, or the exhibition of the shaking apparatus. To what extent this is to be lamented we are unable to say.

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25. For a *Machine for Picking, Curling, Twisting, and Untwisting Hair for Mattresses;* Jason C. Osgood, and Asahel Green, Eaton, Madison county, New York, December 18.

There is no claim made to this hair twisting and picking machine, yet, in the twisting part, we see but little difference between it and those which we have known in operation. The picking part consists of a cylinder, or drum, turned like a grindstone, and having projecting spikes, or wires, on its periphery, which work between others on a concave, the hair being fed to it by an endless apron, in the manner of some thrashing machines. There are some particulars noticed which we do not think it necessary to point out, as not being of importance in themselves, and especially as we are left in the dark respecting the intention to include them in this patent.

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26. For the *Application of Cork to the filling of Beds,* and other useful purposes; Stephen Bates, Boston, Massachusetts, December 25.

The cork is to be first dried, and then ground, or grated, to reduce it into pieces the size of a walnut, and smaller. When so pre-

pared it is to be used for all the purposes of stuffing to which feathers, wool, hair, &c. are applied. Beds, mattresses, and pillows, so stuffed will, we are told, serve the purpose of life preservers, in case of disaster in steam-boats, and other vessels.

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27. For a *Vertical tortive wire door spring;* John Codman, city of Boston, Massachusetts, December 28.

The point, or part, claimed in the specification of this patent, is not that which the title would indicate; and that part of the apparatus which is claimed as new, is described in such a way as would seem to confine the inventor to the exact form and arrangement given by him. The door spring is to consist of a piece of wire about twice as long as the height of the door. This wire is to be doubled, leaving a loop at one end, which may be hooked upon a metallic plate screwed on to the door, near its bottom, and to the hinged joint. The wires are to be lightly twisted together, making one turn round each other in about a foot. An apparatus, called the graduator, is to be fastened on to the door casing, just above the hinge joint of the door. Into a wheel having teeth upon a projecting rim, formed in the manner of a crown wheel, the two ends of the wire are to be secured, about five-eighths of an inch apart. When the wheel is turned upon its centre pin, as it stands horizontally, the twist of the wires will be thereby regulated. The teeth surrounding the wheel are to receive a pin to retain it in any required position. The claim is to "the regulating box, and the teeth and groove of the regulator, and the application of them."

The thing to be effected is so simple, and the modes in which it may be done so numerous, and some of them so much less complex than the one proposed, that a claim so restricted appears to be of little value.

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28. For an improvement in the *Process of Tanning Leather;* Edward Evans, Salem, Westmoreland county, Pennsylvania, December 28.

It is proposed to dispense with the use of lime, and likewise with the process of sweating, by one or other of which the hair is ordinarily removed in the preparatory process of tanning; and also to complete the operation in less than one-half the usual time. The patentee calls his improved mode "the vegetable fermentative process of tanning."

Into each of four barrels is to be put a bushel and a half of chopped Indian corn, or other grain; or, in lieu of these, an adequate quantity of any vegetable matter, which will undergo the vinous fermentation, to produce which a suitable portion of scalding water and yeast are to be employed; when this process has commenced the contents are to be emptied into a vat prepared by being half filled with clean soft water; the ingredients are to be stirred, and the vat covered, so as to renew the fermentation. Hides which have been well soaked and fleshed are then to be put into the vat, and occasionally handled,

until the hair is loose, which, under proper management, will be in a few days. When they have been haired, and again fleshed, they are to be replaced in the fermenting liquor, and worked out in the course of a day, or so. They are then prepared for handling in strong oose, into which a barrel of fermented liquor has been poured; after a week they are to be laid away in strong leaches, containing also a barrel of the like liquor.

The claim is to the applying the principle of vegetable fermentation in the manner described, throughout the whole process of tanning.— Experience is the best tutor; if the process answers well, we have nothing, therefore, to say against it, although its theory may appear to be a little mystical.

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29. For an improvement in *Water Wheels;* Henry Crenshaw, Anderson District, South Carolina, December 28.

The patentee calls his invention a *multiplied water power*, and says that it consists in "the repeated application of water to a number of wheels in succession." Instead of allowing the water of a given head to act upon a single wheel, the patentee proposes to carry the water down an inclined plane, in the form of a trough, and to have a succession of undershot, or flutter wheels, one behind the other. He supposes, by way of exemplification, that there is a fall of ten feet, and states that there may be then an inclined plane of one hundred feet in length; on such a plane from twenty-five to one hundred wheels may be placed, as they may vary from one to four feet in diameter. From the shaft of each wheel, bands are to be extended to a main shaft carrying a fly wheel. The superiority of this plan over that of a single wheel is said to be that the desired velocity for sawing, grinding, &c. may be at once obtained.

We could scarcely think of a more certain mode of diminishing the power of falling water than by dividing it in this way; its own friction against the plane or trough, the friction of so many axles, the bending of so many bands, and the keeping of so many parts in order, will consign this invention to early oblivion, excepting the outlay which it may occasion should, for a time, serve as a momento that such a thing once was.

In point of novelty, we will remark that the using of wheels in succession, and the gearing them so that they shall concur with each other, have been repeatedly done, although not in the mode prescribed by the present patentee. It has been adopted principally where there has been a high fall, and a small quantity of water, rendering it impossible, or inconvenient, to make a wheel of sufficient diameter to apply the whole power at once.

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30. For a machine for *Making Stock Brick, Tile, &c.;* David Flagg, jr., city of New York, and Amos Parker, Sweden, Oxford county, Maine, December 28.

In this machine we do not perceive any thing new in principle, and but little variation in point of arrangement from other machines

now in use. A vertical shaft is to be turned by means of a sweep, a tub surrounding the shaft at its lower end; arms extending from this shaft, work between others on the sides of the tub, and by these the clay is to be mixed. Openings are left on opposite sides for the clay to pass out into chambers, from which it is to be pressed into moulds by means of lever power. The moulds are placed on carriages carried backward and forward by a rack and pinion.

The claim is to "the manufacturing stock brick, tile, &c. at one operation, as above specified."

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31. For a *Machine for making Shingles, Staves, Heading, &c.;* David Flagg, jr. city of New York, December 28.

This machine is intended to be driven by a water wheel, a crank from which works a lever beam, carrying at its opposite end a frame, sliding between fender posts, to which frame a knife, or frow, is attached, which cuts the shingle from a bolt firmly secured upon a bed. The shingle, when cut, is forced edgewise between two knives, by means of a follower. To give the proper taper to the shingle, the knives are nearer together at one end than they are at the other. Fixed saws are used to score the shingle crosswise, which shortens the shaving, and thus enables the knives to shave it readily. These operations, or, rather, the means of performing them, are not clearly described, and, in fact, the details of the whole machine are in many points obscure.

The claim is to the machine generally, and to the vibrating beam to work the gate; the latter with its frow, or knife; the mode of securing the knives; the peculiar construction of the driver; and the saws used to score the shingles.

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32. For a *Portable Horse Power*, for propelling machinery; David Flagg, jr. city of New York, December 28.

The claim made in this patent is to "the peculiar arrangement of the several parts of the portable horse power, for propelling machinery." This machine has one merit at least, in not claiming to gain power, as is the case with several of its predecessors. A vertical shaft is to be turned by a lever to which a horse is attached. The peculiar arrangement consists of the wheels, pinions, and shafts, by which the motion is communicated below, instead of above, the horse-walk. We suppose that it is from this construction that it derives the name of portable, as it occupies less space than the common horse mill, and may therefore be more readily packed up, and transported to a distance.

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33. For a *Machine for making Wrought Nails;* John V. Green, city of New York, December 28.

We have before alluded to a similar machine, in vol. viii. p. 114, of this Journal. Had the patentee copied the drawing given in the *Recuiel Industriel*, the likeness could scarcely have been more perfect. For a description of it our readers must turn to the foregoing article,

as the present specification does not present any greater novelty than would be presented by a claim to a fork with three prongs. The things now proposed to be made are nails; in the patent alluded to it was horse shoes; in the original machine we get back again to nails.

34. For a *Plough;* East Russel, Fairfield county, Ohio, December 28.

It appears that the improvement in this plough consists in a loop by which the sheath is made fast to the land-side of the plough, rendering, it is said, "the whole architecture of the machine more firm, consolidated and secure, than any other now in use." The patentee also states that he "makes ploughs both right and left handed, and wishes both to be included in his patent."

35. For an improvement in the *Self-sharpening Plough;* Waldron Beach, city of Philadelphia, December 23.

Mr. Beach is the patentee of a self-sharpening plough, his first patent being dated August 26th, 1823. His present patent is for making a share triangular, and affixing it in such a manner that it may have three cutting edges; he also claims the "securing the reversing point without a bolt. His description is extremely brief, referring entirely to the drawing, without which the particular forms indicated could not be easily explained.

36. For an improvement in *Building Stoves and Chimneys;* Asa Graham, Rumford, Oxford county, Maine, December 28.

A single flue is to be built from the bottom to the top of the house; the fireplaces are to be built independently of the flue, and something in the form of a Franklin stove, and from each of these, pipes are to pass into this common flue. The fireplaces are to be so constructed as to adapt the stove pipe to them. This comprises the whole *invention*, which the patentee avers he has never seen in use in this or any other country; which declaration we doubt not is perfectly true; but how far he has travelled from his own village, or how closely he has examined what has been done in this and other countries, we are not told, and if left to guess, we should conclude that his reconnoisances have not been very extensive, he must otherwise have discovered many a range of counting houses and stores with flues built in the walls, and stove pipes leading into them, one above the other, from stoves of various kinds.

In what point of view this plan could be considered as an improvement, were it actually new, it would be no easy thing to tell. Where it is followed, it is adopted for economy of room and money, and not because it is equal to that of independent flues for each fireplace.

37. For a *Double reflecting Baker and Roaster;* Samuel Hascy, Rensselaerville, Albany county, New York, December 28.

Numerous modifications of the common tin bake oven, or kitchen, as it is called, have of late been patented, and in the present case we

have a new recruit in the same company. "The improvement which is claimed as new, is the peculiar formation of the lower reflecting plate, and of the front connecting wire, by which all the necessary apparatus for both baking and roasting are combined in one oven, and is considered as an improvement only on "Dobson's double reflecting baker," "for which letters patent have already been granted."

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38. For an improvement in the method of *Sawing marble and other stone, and cutting or working mouldings, or groovings, thereon, and polishing the same;* Isaac D. Kirk, city of Philadelphia. First patented July 3d, 1832; patent surrendered and reissued on an amended specification, December 28th, 1832. (See specification, at p. 324.)

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39. For *Clarifying Sperm and other Oils;* Ephraim C. Moss, city of New York, December 28.

The agent employed for clarifying oils of various kinds, is heat, applied through the medium of steam, or boiling water, in any suitable apparatus. The oil is to be put into a tin kettle, which fits into a copper, or other, boiler, by means of which it may be surrounded with boiling water, or steam. A close cover is to be fitted on to the tin kettle, and openings are made for supplying water and oil, and also for the placing of a safety valve. Oil kept at a moderate heat, in this way, will, it is said, be clarified in a few hours, a portion of the foreign matter rising in scum, and another portion precipitating. During the process the rising scum is to be removed. The patentee states that one great advantage of his procedure is, that it can be followed at all times and seasons, whilst the refining of oil by exposure to air and the direct rays of the sun is restricted to fine weather, and limited portion of the year.

This process admits of the use of caustic ley, sometimes employed, in which case the ley is to be thoroughly mixed with the oil before the heat is applied.

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40. For an improvement in the *Bar Share Plough;* Moses Huffman, Elizabeth, Coates county, Tennessee, December 28.

The things described in the specification of this patent consist of trifling variations in point of form, and in the manner of putting some of the parts of the plough together, the insertion of which would not be very productive either of gratification or instruction.

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41. For an improvement in the *Locomotive Steam Engine, and other rail-road carriages;* Colonel Stephen H. Long, of the United States engineer corps, city of Philadelphia, December 28.

There are several different items presented in the specification of this patent, but most of them are described in such terms as to leave the engineer who shall attempt the construction of an engine from the account given of it, a great latitude of means, and to require the aid of some inventive genius on his part. Where this is the case the

things claimed ought to be essentially new in principle; as the particular mode of combining and arranging certain parts, which constitutes the only novelty in many machines, is not relied on. Notwithstanding the known talents and judgment of Colonel Long, we apprehend that some of the things patented by him will not be found to possess all that novelty in principle which will form a secure basis for a patent. The specification is of considerable length, and we are not willing to dismiss it with that kind of brief analysis to which we in general confine ourselves.

The boilers of his engine, which are the first things described, consist of two horizontal cylinders, with one or more flues passing through them, the fireplace being exterior to, and below the boilers. Oliver Evans, it is observed, employed a single boiler of this construction in his steam engine, and others have since applied them to different purposes; but "this mode of construction is believed to be entirely new in its application to locomotive steam engines." We much doubt whether *this application* of what was previously known, constitutes such an invention or discovery as is contemplated by the patent law. If it constituted a part of an existing patent, it could not be used, and if it belonged to an expired patent, or made part of a known invention, it cannot be incorporated in a new patent, although any specific improvement upon it may be.

A boiler consisting of three cylinders, without flues through them, is next claimed; this kind is preferred when the diameter of the cylinder is not more than fifteen inches. The fireplace and broad flue are similar to those employed with the first named boilers, but the chimney, in this latter construction, must be placed at the back end of the boiler. The middle boiler of the three, is made a foot or so shorter than the others, to admit a square flue to connect with the round switch flue above it. A slab of soap stone, or some similar article, is used to intercept the heated air in its passage into the flue, and to compel it to pass immediately under the back ends of the exterior boilers. The three boilers, thus constructed, form the second claim.

The moveable switch chimney used in this engine, is made to turn on hinges, so that it may be laid horizontally in passing through tunnels, &c. This, it is stated, differs from the chimney described in the 4th item of the patentees' specification of June, 1831, in having but a single, instead of two oscillating joints.

A substitute for the force pump of ordinary engines is next claimed; this is designated the *free pump.* It, however, is more properly a reservoir, which is intended to contain water to supply the boiler. This reservoir, or vessel, is situated above the boilers, is closed at top by a dome, and has two tubes leading into it from the boilers, one of them entering into it at top of the reservoir, and admitting steam, the other passing down and communicating with the water in the boilers. Each tube must have a cock, or valve, to open or close it. Water may be admitted into this steam-tight reservoir, and may be heated there, by allowing waste steam to enter a casing by which it is surrounded. When this supply water is to be admitted into the boiler the cocks of both tubes must be opened, and the contained fluid being subjected

to equal pressure both above and below, it will flow freely into the boilers. The patentee states that the principle of this apparatus was described to him by Charles Whetherill, Esq., of Philadelphia, in the summer of 1831, but that he claims the manner of construction which he has described, and especially its use in locomotive engines. For whatever of novelty there is in the arrangement adopted by Colonel Long, he is fairly entitled to a patent as an improvement. The principle of allowing water to flow from a reservoir into a boiler by equalising the pressure upon its upper and lower surface, we have known for several years, and cannot now tell where we first learned it.

In order to dispense with the bell cranks and their appendages, Col. Long states that he has made a compound axle, in three parts; which, however, he has not described, nor is it represented in the drawing; but the model deposited in the patent office is referred to as an exemplification of it. As the model forms no part of the legal description of a patent, and cannot be published, we make it a rule to depend upon the specification and drawings in preparing our analysis, and cannot, from them, give any account of this part of the invention.

A method of heating the water in the *free pump*, by means of the waste steam, and of preserving the heated water resulting from this steam, is next described, not however with reference to any specified construction of the apparatus employed, but only in that general way of which we have before spoken.

A different mode of constructing the wheels from that indicated in the specification of June, 1831, forms the next item in the present patent. The model is here again referred to for an exemplification; but we are informed that the wheel is to be made in part of iron, and in part of wood, the rim, together with its flanches, being cast separately from the hub and spokes, with parts formed upon it to receive the latter, which are to be held fast by bolts, clamps, &c. The spokes are to narrow down as they recede from the hub, but in other points are to be like those described in the specification of June, 1831.

The last claim is to "the successful application and use of anthracite coal" in locomotive engines; nothing, however, is said respecting the mode in which this successful application is effected. We are told merely that it has been used continuously for more than one hour, at a speed of ten miles or more in that time, and with a weight in a train of cars equivalent to five times that of the engine, the road being level, but that the speed will be proportionally decreased should the load be augmented.

If Colonel Long has succeeded, with the ordinary draft, in applying anthracite so as to answer for fuel in long trips, a great desideratum has been obtained by him, as all previous attempts have entirely failed. The difficulty of using this fuel in a locomotive, arises from the coal packing down, in consequence of the continued vibration to which it is subjected, which packing very soon stops the ordinary draft through it. To stir it up will not remove this difficulty, as those who have burnt anthracite well know; it being all important that the pieces of coal, when ignited, should preserve their relative positions. By

means of an artificial blast air enough may be forced through the coal, notwithstanding the packing; and we know of no other means by which it can be effected. This was first accomplished, we believe, by Mr. Phineas Davis, on the Baltimore and Ohio rail-road.

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42. For a *Washing Machine;* Jacob Lindsey, Cannajoharrie, Montgomery county, New York, December 28.

A box, or trough, has a curved bottom formed by framing slats into two strips, which are segments of a circle. A segmental vibrating piece, similarly constructed, is suspended by a rod attached to a pin in a frame above, which pin is the centre of the curvature of the trough and vibrating piece. The two parts do not come into contact with each other, but allow a space between them, to be occupied by the clothes to be washed. This washing machine resembles many others, the main difference being in its having small slats placed at a distance from each other, instead of the rollers usually employed.

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43. For a *Machine for pressing Straw and other Hats;* Otis Plimpton, Foxborough, Norfolk county, Massachusetts, December 28.

The apparatus here described consists, in part, of a suitable block fixed to the frame work of the machine, and upon which the hat is to be placed when pressed, which is done by a heated flat iron; to this a horizontal motion is given by a shaft carrying an eccentric, which acts apon a lever, to the opposite end of which the pressing iron is attached. By placing the foot upon a treadle, the pressure may be regulated in any required degree. There is a number of different contrivances for throwing the machine in and out of gear, and for other purposes, which cannot be shown without the drawing.

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44. For *Fastenings for Bedsteads;* John Richman, Lancaster, Fairfield county, December 28.

The description of this affair is comprised in six lines, but the thing itself may be found in the shops of most of our ironmongers; that is, if it has not gone out of use, and given place to the good, old-fashioned, screws.

A dovetail mortise plate is to be let into the posts, and a projecting piece into the rails, and this, and that, are to be put together, as heretofore.

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45. For an improvement in the *Machine for Kneading Dough;* Nimrod C. Willet, Jonesborough, Washington county, Tennessee, December 28.

Two rollers are to extend across a table, one above the other. The lower roller is to be smooth, and is to be sunk into the table about two-thirds of its diameter. The upper roller is to be fluted and turned by a crank. They are to be about five-eighths of an inch apart.

How much of novelty there is in all this we cannot tell, but the machine is so much like many which we have seen in use, particular-

ly to the south, that we should have hailed it as an old acquaintance had it not been now introduced to us under the sanction of a new patent.

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46. For a *Mode by which the Water which is now usually expended in the passing of canal boats through locks is in great part saved;* Jacob Dewees, Pottsville, Schuylkill county, Pennsylvania, December 28.

(See specification at p. 111.)

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47. For an improvement in the mode of *Drilling and boring out the Wheels of Rail-road Cars;* Dean Walker, Franklinville, Baltimore county, Maryland, December 28.

(See specification.)

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48. For a *Machine for Washing and Drying Clothes;* Thomas Pierce, Hartwick, Otsego county, New York, December 29.

The trough of this machine is triangular within, the horizontal cover forming one of its sides; the ends of the trough, which meet together at the bottom, form the other two sides of the triangle. A lever working on a fulcrum above the trough, and extending beyond its two ends, has two curved pieces mortised into it which descend into the box, and pass through slots in its top; each of them is about a quadrant of a circle. Each of them has a flat board perforated with holes, fixed upon its lower end, and extending along the whole width of the box. When the lever is forced down at one end, the board upon its quadrant will have its face brought into contact with the opposite side of the triangular box, and so of the other end. The clothes placed in this trough, with a due portion of soap suds, are alternately squeezed by these boards against the opposite sides of the trough. This kind of action upon them is undoubtedly better than that of many other washing machines. What is called the *drying* part of the apparatus, is one which is a substitute for wringing. A square box perforated with holes receives the wet clothes, and a follower is brought down upon them by means of a rack and pinion.

There is no claim made, and how far the whole apparatus may be considered as new, we leave to the judgment of those concerned.

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49. For an improvement in the *Machine for Ruling Paper;* Alfred Hathaway, Troy, Bristol county, Massachusetts, December 31.

It is intended, when necessary, to rule the paper on both sides by placing it once on this machine; we cannot without the drawings give a good idea of its construction, and even with them it is not easy to trace the particular operation and arrangement of some of its essential parts; the description not being sufficiently lucid, or the drawings sufficiently in detail.

The claims made are to " the ruling both sides of paper at one operation. The application of the motion to the machine, and the gene-

ral arrangement of the machine, and the operating of it by one person. The peculiar construction of the pens. The application of the pens to the top of the cylinder."

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for a bent Cylinder Primer for Discharging Cannon. Granted to JOSHUA SHAW, *city of Philadelphia, December* 3, 1832.

To all whom it may concern, be it known, that I, Joshua Shaw, of the city of Philadelphia, have invented a conducting, or bent, cylinder primer, for discharging cannon, which is described as follows.

The conducting, or bent, cylinder primer, consists of a hollow tube of any metal or other substance, suitable for the purpose, filled with any of the fulminating powders, or fulminating mixtures, known to chemists, and in use as a priming material for guns in general, or in part with such fulminating mixtures, and in part with gunpowder.

The conducting, or bent, cylinder primer, which is made of any convenient size or length, suited to the gun, or lock, on which it is intended it should operate, may be in length from one to eight inches, and has a short bend at one end, which bend, or arm, may be from a quarter of an inch to an inch, or more, in length; the longer arm, or bend, is made to enter the vent, and to conduct the fire to the charge; the shorter arm, or bend, is made to extend from the vent to any point convenient, and where the lever-hammer, or cock, can be placed so as to act upon it without coming in immediate contact with the vent, by which means the eye and the vent field are relieved from all obstructions and incumbrances, and the sighting of the gun rendered more easy and perfect. I usually make and prepare the conducting, or bent, cylinder primer, after the following manner.

I melt together equal parts of lead and tin, which I form into cylinders by means of a mandrill, and draw-plate, after the usual manner of making hollow cylinders. I then decide upon the length and bend it at the required point, which shall be acted upon by the gun lock. I then fill the whole cylinder with the fulminating powder, and secure it in by closing the metal at each end, and afterwards dipping them into melted wax, or varnish. It is not, however, necessary that the bend, or arm, which enters the vents, and conducts the fire to the charge, should be filled with the fulminating powder, and I therefore, as choice or economy may dictate, fill this portion of the tube, or cylinder, with common gunpowder, which is found to act equally well upon the charge.

When the conducting, or bent, cylinder primer, is required to be used, the longer arm is placed in the vent of the gun, and the shorter arm is conducted by a small groove cut in the gun or vent field to receive it, to where the lever hammer, or cock, is made to strike, for the

purpose of igniting it.—Although denominated a cylinder, the tube may be in any other form.

The advantages secured by this form of primer, are, that it can be acted upon and ignited by a lock far less expensive and less complicated than those in general use, which strike immediately over the vent of the gun. It renders the vent-field free from incumberances, and the sighting of the gun clear of all obstructions.

I claim the conducting, or bent, cylinder primer, made and applied after the manner, and for the purposes, hereinbefore described, whether the same be formed of lead and tin, or of any other material.

Joshua Shaw.

Specification of a patent for a Compression Cannon Lock. Granted to Joshua Shaw, *city of Philadelphia, December* 3, 1832.

To all whom it may concern, be it known, that I, Joshua Shaw, of the city of Philadelphia, have invented an improved lock for the discharge of cannon, which I denominate the *compression cannon lock*, and that the following is a full and exact description of its construction and use.

Description of the Compression Cannon Lock.

The invention which I claim under this title may be described in general terms, as a lever attached to the gun near the vent, which lever is set in rapid motion by the application of muscular force, and then impinges upon a percussion primer, so as to compress it suddenly—the fire of the primer thus produced, passing along the vent-hole into the chamber of the gun, discharges the cartridge.

The modification which I most approve may be described as follows: it is adapted to the form of primer which is denominated the *bent cylinder*, invented by me.

A small groove, or channel, is cut from one side of the vent-field, to the vent, which may receive and retain one leg of the primer when the other is passed down the vent-hole. A plate, or platform, of metal, about three-quarters of an inch thick, is secured by screws to the side of the vent-field, a little lower than the groove above-mentioned. A shoulder rises on this plate to the level of the vent-hole; its face is towards the butt of the gun, and flush with the forward line of the groove, so that the primer passing along the groove and projecting beyond it, passes also along the face of the shoulder. The lever employed is of the first form; it is a solid square-edged bar of steel, two and a half, or three, inches long, about three-fourths of an inch wide, and one-half of an inch thick; the fulcrum is placed so as to give the limbs the relative length of about three and one. This fulcrum is a stout, well-tempered pin, which passes through the plate above described, and permits the lever to play horizontally on it. The ful-

crum passes into the plate, a little back of the line of the groove extended. When the lock is not in action, the lever lies parallel with the vent-field, its longer arm towards the muzzle of the gun, and it is retained in this position by the pressure of a feather spring: when the lever is brought round so as to be perpendicular with the side of the vent-field, the shorter arm passes, in its revolution, the line of the groove extended, and is arrested by the shoulder. The part of the lever which thus strikes against the shoulder, is fashioned so as to strike it with a vertical edge, or angle. A wire, cord, or other bridle, is fastened at one end to the longer arm of the lever, about three-fourths of an inch from its extremity. The lock, excepting the bridle, is enclosed in a neat brass casing, about four inches long by an inch wide and an inch deep, or thereabout; in which casing, however, is an opening adjoining the groove of the vent-field, to admit the end of the primer, and another opening at the side, to allow the lever to play.

The primer, having been adjusted in the groove prepared for it, and extending into the lock, the bridle, held by the gunner, is drawn smartly towards the butt of the piece; the lever flies round, its shorter arm compresses the primer against the shoulder of the lock, explodes it, and discharges the cannon.

The advantages attained by this lock, consist

1st. In its simplicity of structure, and consequent cheapness of manufacture, and security from accidental derangement.

2. In the small bulk it occupies, and its security against extrinsic injury.

3. In the circumstance that it does not, in any degree, interfere with the sighting of the gun, or with its discharge by any other means; differing in this particular from all other locks in general use.

What I claim as my invention, and for which I ask a patent, is a percussion cannon lock, the main acting part of which consists simply of a lever drawn forward by hand, a part of which lever, or a lip, or piece whereon, compresses, or strikes, upon a *percussion primer*, at a convenient distance from the vent. And this I claim whether the same be constructed in the precise form described, or in any other in which it acts upon the same principle and produces the same effect.

JOSHUA SHAW.

Specification of a patent for a Portable Cannon Lock. Granted to JOSHUA SHAW, *city of Philadelphia, December* 3, 1832.

The portable cannon lock consists of 1. a *trigger*, placed near the handle, or butt, of the stock, acting by means of a connecting wire, or otherwise, on 2, a *gun, or pistol, lock*, on the percussion plan; the cock, or lever hammer, of which, when liberated, strikes on a percussion primer, placed at one end of 3, a *conductor*, or perforated tube of metal, which is arranged at one end to receive and retain the percus-

sion primer, and at the other end to fit against, or into the vent-hole of the cannon.

The gunner, having cocked the lock, places a percussion primer upon the end of the conductor, which is formed to receive it, rests the other end of the conductor upon the vent of the gun, and draws the trigger. The cock, or lever-hammer, falls, explodes the primer, and the fire thus produced passes freely through the conductor and vent-hole into the chamber of the gun, and discharges the cartridge, without the use of a priming wire, or of other priming.

I claim as my invention, the combination of parts above described, by which I attain the several advantages of a cannon lock on the percussion plan, without any of the disadvantages attending locks fixed to the piece, and without the hazard and delays attendant on the use of match, priming wire, and priming horn. I also claim as my invention, the part of the machine which I have denominated the conductor, or the tube by which the fire is communicated to the charge, whether the same is used with the portable cannon lock, or in any other combination, or mode, by which it is made to discharge the vent.

Of the many modifications of which this detached lock is susceptible, I thus describe the particular one which I most approve: it is intended for the discharge of ship guns.

The stock is in the form of a pistol stock, about twenty inches in length. The trigger is placed as on the common pistol, so that the forefinger of the hand which grasps the butt of the stock, may rest on the trigger. The action of the lock is altogether at the further end of the stock; it is included in a metallic case, and the sear connects with the trigger by a communicating wire, or bridle, passing lengthwise through the stock. The conductor is about two inches long, placed at right angles with the axis of the stock, and inserted into the extremity of the lock. The hammer, or cock, has a vertical motion. The primer used in this case, is a modification of the bent cylinder primer, invented by me.

JOSHUA SHAW.

Specification of a patent for abstracting the heat from the smoke and gas of air heaters, and for applying basket grates to such heaters. Granted to DAVID STEINHAUER, *city of Philadelphia; an alien who has resided two years in the United States, December* 13, 1832.

In meditating on the best plan, in an economical point of view, of heating houses by warm air, and from actual experiments made upon the subject, I have satisfied myself fully that by far the most durable of all fireplaces is a basket grate for the fire, when suspended in a cylinder, or air heater, of larger diameter, in such a way that the bottom of the grate and the bottom of the cylinder form the top of the ash pit; allowing the air thence to play freely in the space between the grate and the cylinder, round the fire, yet checking its ascent in that space

beyond the top of the grate, by a ring, or flanch, closing the said space effectually at such height, where a single range of fire brick may be conveniently applied, for the protection of the cylinder, in the immediate vicinity of the fire; while the rush of air below said ring, or flanch, will sufficiently cool the sides and bottom of the basket grate to prevent their being injured by the heat of the fire, though the air may attain such a temperature as will maintain the radiating glow of the fuel, facing the lower part of the cylinder, aiding at the same time the combustion, instead of ascending, unobstructed, at a lower temperature, to the injury of the heat evolved above.

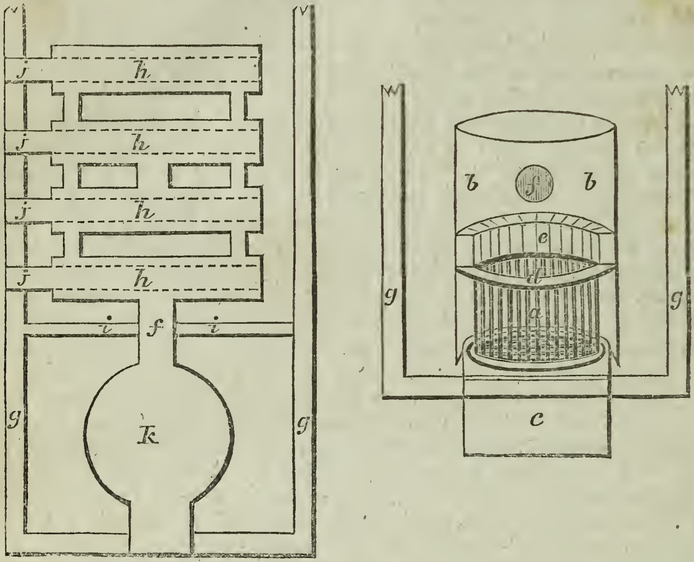
I have in the same way fully satisfied myself that the violent combustion brought about in air furnaces, by high chimneys, is by no means necessary for the limited object of heating air to a moderate temperature. Dispensing, therefore, in such case with high chimneys, and carrying the smoke and gas from the fireplace in a horizontal direction, by the original impulse from the combustion, kept up by a continuation of its operation, I find that the heat of the smoke, and gas, may be abstracted to any desirable extent, by a system of double cased cylindrical smoke drums, placed sideways in succession, as gas retorts, inclosed in a walled air chamber, the one drum receiving the smoke from the other, and each having a separate draft of cold air from without rushing through the interior, while a draft from below is provided for taking up the heat from the exterior of the drums; which various currents of variously heated air, will mix together above, and form a medium temperature, either by themselves, if the air chamber containing them be entirely separate, or with the air heated by the main body of the stove, if the separation be made by a lower partition only; the whole to be distributed thence in the house, by pipes or flues from the air chamber.

But though the entire heat of the gas and smoke may in this way be rendered available, yet local circumstances, and more particularly the height of the chimney by which the smoke is to escape, must necessarily be taken into consideration in determining the extent to which it may be adviseable, and even practicable, to carry the saving of heat above alluded to.

I thus claim, as my invention for the heating of houses by warm air, the abstraction of heat to any desirable extent, from the gas and smoke of air heaters, by a system of double cased cylindrical drums, placed horizontally, and in succession, as gas retorts, inclosed in a walled air chamber, either entirely separate from the air chamber of the main body of the air-heater, or forming part of it, by a partition not carried higher than the drums, each drum having a separate, cold air flue through its centre, and a separate or common draft from below to strike the outer casing of each, so as to produce a separate rush of air through and from around each drum, differently heated, of course, according to the different temperatures of the gas and smoke in the respective drums, but mixing above into one body of a medium temperature for further distribution in the house by pipes, or flues, from the air chamber.

And with regard to the fireplace itself, I claim as my invention the

particular application of a basket grate, by suspending it in a cylinder or air-heater, of larger diameter, so as to allow the air to play freely in the space between the grate and the cylinder, round the fire, yet checking its ascent in that space, beyond the top of the grate, by a ring or flanch, closing said space effectually at such height.



a, The basket grate.
b b, The cylinder.
c, The ash pit.
d, The ring or flanch.
e, A range of fire bricks.
f, The smoke pipe.
g g, The walls of the air chamber.
h h, The double cased cylindric drums.
i i, The partition wall.
j j, The pipes to convey the air into the interior of the drums.
k, The bottom of the cylinder.

Remarks by the Editor.

In the absence of personal observation upon the effects of the apparatus patented by Mr. Steinhauer, we have availed ourselves not only of a correspondence with the patentee, but also of the information derived from a gentleman, residing in Philadelphia, who has witnessed the experiments with, and the actual operation of, the apparatus described in the foregoing specification. He is a man of practical science; his testimony may therefore be relied on, and it confirms, in all respects, the statements of the patentee, which we will give in his own words.

"The trials made subsequently to those which were witnessed by our mutual friend, have all tended to confirm my opinion of its excellence. The double cased drums exceed my expectation in their power of abstracting the heat from the smoke and gas; and the basket grate, when properly hung, burns the anthracite admirably, and well deserves to be called *indistructible.* I have had one in constant use during the winter in my own house, which shows no trace of the intense fire which has been kept up in it; indeed I am well convinced that it would last twenty seasons as well as one, while I have never known the solid iron cylinder, used for the same purpose, however strong, last more than two seasons, and frequently not even one. The bars of the grate, when the fire is at the hottest, barely attain a cherry red, and consequently do not waste from scaling, while the sheet iron casing is scarcely incandescent in the dark, and therefore never produces that unpleasant smell so much complained of when the air comes in contact with red hot iron.

"In one of my basket cylinders I had, by way of experiment, two bushels of good anthracite put, and well ignited. It was then left untouched for three days and three nights, at the expiration of which time I had the ashes stirred out, and was surprised to find still some glowing embers in the centre, and from the whole quantity of coal not more than one quarter of a peck of unconsumed material."

The patentee is a manufacturer of stoves, and other articles of that description, and is familiar with the various plans of warming public and private buildings with heated air, as practiced in Philadelphia, where much has been done in this way; in many cases with considerable success, but in others, expectation has been entirely disappointed, after the expenditure of much money. In a heated air stove in a private house, it is stated that a quarter of a ton of coal was sometimes burnt in a day, without deriving sufficient heat from it to warm the building. On examination it was found that the heated air, after ascending five stories, escaped at a temperature of no less than 370° Fah. This, no doubt, was an extreme case of waste, but, in general, the quantity of heat, and consequently of fuel, lost, is very great. With Mr. Steinhauer's apparatus, the temperature of the smoke and gas escaping from the chimney, has been found to be but a few degrees above that of the surrounding atmosphere. Hot air chambers, on the ordinary construction, have been altered upon the plan of Mr. S., and the effect of the furnace in many instances doubled, without disturbing the original fixtures.

Specification of a patent for an improvement in the mode of drilling and boring out the Wheels of Rail-road Cars. Granted to DEAN WALKER, *of Franklinville, Baltimore county, Maryland, December* 28, 1832.

To all whom it may concern, be it known, that I, Dean Walker, of Franklinville, in the county of Baltimore, and state of Maryland,

have invented an improved mode of drilling, or boring out, the wheels of rail-road cars, so as to centre them perfectly on the axles; and also in the mode of drilling the pin holes by which they are afterwards attached to the said axles, and that the following is a full and exact description thereof.

The machinery which I use for these purposes, resembles, in its general construction, the slide, or rack lathe, well known to machinists, and my invention consists in such an arrangement and adaptation thereof, as fits it to the particular purpose to which I apply it. The mandril of the lathe by which the wheels are bored out, is made hollow, so that the cylindrical shaft which carries the cutters may slide into it to a depth equal to that of the bored part of the wheel. The wheel is to be centred upon a plate affixed to the mandril, to which I attach it, whilst boring, by means of nuts and screws, or otherwise. The lathe may be driven by a whirl on a shaft which carries a pinion taking into a toothed wheel on the mandril, so proportioned to each other as to produce the proper degree of speed, or in any other way producing the same effect.

The cylindrical shaft, carrying the bits, is sustained upon a slide in front of the mandril, its inner end passing through the part of the wheel to be bored, and into the cavity of the mandril prepared for its reception. The cutters are held in mortices in the shaft; of these there are two sets; the first, of a proper size for boring through the wheels, the second, placed behind the former, to face the wheel as the first passes through.

The cylindrical shaft, with its bits, are made to advance by means of a rack and pinion, to which motion is given from the revolving mandril. Instead of a rack and pinion, however, a screw, or other contrivance, may be employed, so as to force the slide and cutters forward, by force, or power communicated to them from other parts of the machinery.

After the wheels have been put upon the axles, a machine very similar to the former is used for drilling the holes to receive the pins which attach them to each other; the above described mandril, however, not being employed. I usually drill the holes at both ends of the axle at the same time, for which purpose the machine is made double. The ends of the axles, which pass through the wheels, rest on boxes fixed upon benches which sustain the slides carrying the drills. The mandril, or shaft, which receives the drill runs in collars like those of a lathe mandril, and is made to revolve in the same way. The slides are made to advance by means similar to those described for forcing forward the boring shaft, in the first mentioned machine.

I have given the foregoing description of the machinery which I use in order to enable any competent workman to carry the same into effect, agreeably to the modes represented in the drawings deposited in the patent office, but without intending to claim those machines in their general arrangement as my invention; or to confine myself to the exact arrangement there represented; but what I claim as my invention, and for which I ask a patent, is the forcing the cut-

ters and drills forward by means of a rack and pinion, or by a screw or other mechanical instrument producing a similar effect, and having their advancing motion communicated to them by their connexion with the other parts of the machinery, for the purposes hereinbefore described.

Dean Walker.

Specification of a Patent for an improvement in the mode of constructing and weighing by the Steelyard Balance. Granted to Erastus *and* Thaddeus Fairbanks, *St. Johnsbury, Caledonia county, Vermont, September* 22, 1832.

To all whom it may concern be it known, that we, Erastus Fairbanks and Thaddeus Fairbanks, of St. Johnsbury, Caledonia county, Vermont, have invented a new and improved mode of constructing, and of weighing by means of, the steelyard balance, and that the following is a full and exact description of our said improvement.

The main object had in view by us was to adapt the balance, more perfectly than has heretofore been done, to those machines which are constructed for the purpose of weighing loaded wagons and other articles of great weight; but our improved balance is also applicable to such ordinary weighing as is effected by means of instruments constructed on the general principles of the steelyard, or of what is called Dearborn's patent balance, when the same is used for ponderous articles.

We construct a balance in the general form above indicated, but to the extreme end of it we give that shape which is usually given to the points of suspension in a scale beam. This is done for the purpose of hanging thereto a pendulous rod having a flanch at its lower end, or other contrivance, to support weights, to be presently described.

The arm of the balance is divided, and has a moveable poise and hook, formed in the usual way. Weights, bearing a given ratio to each other, are prepared, to be placed upon the flanched rod at the end of the arm. We will now suppose the balance with its moveable poise to be graduated so as to weigh any number of pounds from one to a hundred; the weight to be placed upon the rod may indicate 100, 200, 500, 1000, or any other number of pounds, whilst the moveable poise will point out the number of pounds intermediate between any of the hundreds. These numbers are given merely for the purpose of explaining the principle upon which we proceed in this part of our invention; its applicability to weights of any required amount, and graduated to any scale which may be preferred, will be at once apparent.

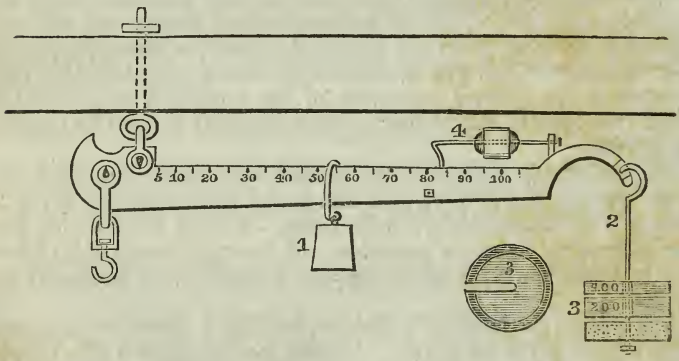
For the purpose of obtaining an exact counterpoise to the platform, and, bringing the beam into the due horizontal position, we attach one end of a screw rod to a standard, usually rising from one end of the

beam, which screw rod extends along in the direction of the beam, towards its fulcrum; its inner end we usually bend down, and curve, so that it may be fastened on one side of the beam, thus removing it out of the way of the hook of the moveable poise. A cylindrical, or other formed weight, is drilled through its centre, and tapped with a female screw, fitting to, and placed upon, the screw upon the rod. This, it will be seen, furnishes the means of regulating the beam with the utmost precision, and with perfect ease. The rod and its weight, stand at a sufficient height above the beam to allow the hook of the poise to pass under them.

What we claim as our invention, and for which we ask a patent, is the combination of the graduated weights to be suspended from the end of the beam, with the ordinary moveable poise, operating in the manner, and upon the principle hereinbefore set forth. We also claim the before described manner of counterpoising the platform, and putting the beam in equilibrium, preparatory to weighing therewith.

Erastus Fairbanks.
Thaddeus Fairbanks.

Fairbanks' Improved Balance.



1. Common poise.
2. Rod to support the Weights.
3. Weights.
4. Adjusting weight.

Remarks by the Editor.

The Messrs. Fairbanks, some time since, obtained a patent for a platform weighing machine, and the foregoing mode of adjusting, and of graduating the beam of the balance, and the weights, was devised by them with a view to its employment with the beforementioned machine. We have had an opportunity of examining one of their balances, and have been much pleased with it; this examination, however, was not necessary to the conviction that it possesses a just claim to the character of a real improvement, the whole arrangement

being so simple, as to enable any person to perceive that it is well adapted to the purpose contemplated, that of facilitating the business of weighing, and more especially that of heavy articles.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

[TRANSLATED FOR THIS JOURNAL.*]

Method of giving a black and glossy coating to cast iron trinkets, and other articles of the same material.

The desire expressed by some of our subscribers to have the receipt for the varnish employed on the cast iron trinkets of Berlin iron, so called, induced us to request a person conversant with the different processes of the arts, to ascertain the best method of making that varnish. We now give a recipe, not for the varnish itself, but for a black coating which can be applied to any description of cast iron articles. This composition is simple, and offers the invaluable advantage of efficaciously resisting the action of the atmosphere, and even of weak acids, so that the process may be employed for coating a great variety of cast utensils commonly used in our families. The coating easily fixes itself on cast iron, and may also be used on hammered iron, but with less certainty of success in the latter case than in the former.

Attach each of the articles to be coated to an iron wire bent above into a hook, and apply a thin coat of linseed oil; the coat must be thin to prevent the oil from running, forming asperities or knots where it collects. Hang them eight or ten inches above a wood fire, so that they may be completely enveloped in the smoke. When they have been thus exposed to a brisk fire for about an hour, lower them so that they shall be near the burning coals, without touching them; at the expiration of about fifteen minutes remove the articles, and immediately immerse them in cold spirits of turpentine.

Any articles which, after this last operation, may be found deficient in brilliancy, or not sufficiently black, are to be re-exposed to the burning coals for a few minutes, and again dipped in the spirits of turpentine.

This process, which may be variously modified to suit different articles, may, from its simplicity, be extensively applied, and will prove useful in all the cases in which cast utensils are subject to rapid oxidation. [*Journal des Connaissances Usuelles.*

On the Saltpetre of Chili, (Nitrate of Soda.)

A question of some importance to a class of manufacturers, is now pending; it relates to the substitution of nitrate of soda, (saltpetre of Chili,) for nitrate of potash.

* By request of the Committee on Publications.

There are in several commercial towns of France, large quantities of nitrate of soda, imported from the district of Atacama, in Peru. This salt, known as Chilian saltpetre, pays an import duty one-third less than that paid by common saltpetre. Some of the manufacturers of Paris, Rouen, &c. having attempted to obtain nitric acid from this article by the process employed when nitrate of potash is used, obtained unfavourable results. This is owing to the fact that the constituents of nitrate of soda are combined in different proportions from those of common saltpetre, and require different doses of sulphuric acid for their separation. 1263 parts, by weight, of nitrate of potash contain 676 parts of nitric acid, and require 1226 of the sulphuric acid of commerce to separate the nitric acid; the residuum is 1539 parts of bi-sulphate of potash. 1066 parts, by weight, of nitrate of soda, contain 676 parts of nitric acid. To obtain nitric acid from this, 614 parts of common sulphuric acid may be used, and the residuum will be 891 parts of sulphate of soda, or 1228 parts of sulphuric acid being used, the same quantity of nitric acid will be obtained, and the residuum will be 1392 parts of bi-sulphate of soda. Hence it will be readily understood that if the manufacturer treats the nitrates of potash and of soda, with the same doses of sulphuric acid, a quantity of the acid which in the first case would be useless, will in the latter be inadequate. As far as the production of nitric acid is concerned, nitrate of soda would have a decided advantage over the other salt alluded to, since 1263 parts of nitrate of potash, and 1066 of nitrate of soda furnish the same quantity of acid, and as 1066 is to 1263 nearly as 5 to 6, there would be a saving in the raw material by using the nitrate of soda, the two salts being supposed at the same price. With regard to the residuums, that from the nitrate of potash is the more valuable; but both the sulphates of potash and soda are at a low price, being used in forming other cheap preparations, such as alum and soda.

The nitrate of soda has an advantage over the other salt in point of purity. It is almost entirely free from extraneous substances, containing scarcely any common salt, while the common saltpetre, before it is entirely purified, contains a portion of that salt, and still more of the nitrates of magnesia and lime. [*Ibid.*

Green Pigments.

1. *Bluish Green.*—Grind on a piece of unpolished glass, and with a glass muller, adding pure water, three parts, by weight, of green oxide of chromium, and one part of oxide of cobalt. Dry the mixture on a sheet of bibulous paper, or other absorbing surface; then heat strongly in a crucible, to produce a union of the oxides.

2. *Cobalt Green.*—Proceed as just directed, substituting for the oxide of chromium, oxide of zinc precipitated from the nitrate of zinc by a weak solution of potash. The nitrate of zinc may be obtained by dissolving zinc in common nitric acid (aquafortis) di-

luted with its bulk of water. The precipitate must be well stirred with a spatula, and washed to get rid of the free potash and the nitrate of potash. To effect the washing, pour water copiously upon the precipitate, stir and pour off the liquid: this should be repeated several times. After the washing, pour the precipitate upon a canvass filter, which is covered with a sheet of unsized paper, and fixed upon a wooden frame resting on a wide mouthed vessel, or filter by a glass funnel, the bottom of which is stopped with linen rags.

In order to ascertain the best temperature for the union of the two oxides, divide the mixture into three parts, using for each a crucible, removing each crucible from the fire at a different temperature. The intensity of the colour is easily varied by altering the proportion of the oxide of cobalt.

This cobalt green, by a proper flux, yields a beautiful blue glass for painting china, &c.

In the Sevres porcelain manufactory a colour is used formed by the application of a particular flux to the bluish green. Varieties of shades may be procured by different mixtures of the oxides of chrome and cobalt. [*Ibid.*

A process for Varnishing Leather for Belts, Cartridge Boxes, &c.

The varnish for leather is the same as that for carriages, except that it contains less copal, and that the oil used in the varnish, for certain coarse articles, should be a little decomposed.

After having dressed and scraped the leather to be varnished, apply upon the flesh side a thin coat of glue water, to which has been added about an ounce of boiled linseed oil. The leather, when dried, is polished, and successive coatings applied until it becomes very smooth. Then mix one part of strong drying oil, (linseed oil, with a considerable dose of litharge,) and one of copal varnish, in an iron vessel, add well pulverized lampblack and spirits of turpentine, and set the whole over a fire. The leather which during this time has been kept in a closet, artificially heated, is now stretched upon a table, a very thin coat of the mixture quickly laid on with a flat brush, immediately replaced in the warm closet, and allowed to dry slowly: when dried it is polished with pumice stone, or which is better, with charcoal finely pounded and sifted. A second coat is applied in the same way, and the operation finishes with a third coat, which should be very lightly laid on, and be very smooth. The leather is now dried without polishing.

Leather for straps, &c. is sometimes manufactured by being passed between rollers; this enables it to receive a higher degree of polish and smoothness. Sometimes the leather is stained with lampblack mixed in glue water, and finished as we have just described. For articles which are not intended to bend, a greater proportion of copal varnish and more spirits of turpentine are incorporated with the coating mixture. These varnishes are laid on when cold. [*Ibid.*

Process for Silvering Iron.

Iron is not easily silvered. The following process will be found convenient in its application to both large and small iron utensils.

After having scoured the piece of iron to be silvered, let it be very evenly rubbed with sand paper, and then dipped into a warm solution of sulphate of copper, (blue vitriol,) or of acetate of copper, (verdigrease.) When its surface has become red, immerse it in clean water. Should the copper not cover the surface equally, it must be again dipped into the solution. The solution of the salt of copper should not be so strong as to produce a precipitate of small particles of copper. Melt silver in a crucible, and let the iron be immersed in it, and rubbed over with a proper tool, so that the silver may adhere equally to its surface. This operation of immersing and rubbing is repeated until the silver is very evenly applied. Care should be taken to press, and not to rub, the surface, lest the thin coat of copper, which facilitates the adhesion of the silver, should be scraped off. When the silvering seems complete, the articles are removed from the crucible and polished. [*Ibid.*

Polishing Powder.

Certain of the French manufacturers of polishing powder use in their manufacture scraps of old iron which they put into a tub and cause to rust quickly by sprinkling with water.

When a sufficient quantity of rust has thus been formed, it is collected by washing, and after allowing it to settle, it is dried and calcined in a crucible.

The longer the calcination is continued, the more the oxide approaches to a violet hue, and the harder its grain. At a very high temperature the oxide is partly reduced, its colour becomes more gray, and the grain is too hard for polishing.

The red oxide serves for polishing gold and silver, the violet oxide is fit for polishing steel.

When taken out of the crucible, it is first triturated, and then levigated, in order to collect the finest parts. [*Ibid.*

A few remarks on the Relation which subsists between a Machine and its Model. By Edward Sang, *Teacher of Mathematics, Edinburgh. Communicated by the Author.*

(Concluded from p. 349.)

Having said thus much on the relative strengths of a machine and of its model when at rest, I proceed to compare their strengths and actions when in motion.

This subject naturally divides itself into two heads; the one relating to the ability of the structure to resist the blows given by the moving parts, either in their ordinary action, or when, by accident, they escape from their usual course; the second treating on the changes which take place on the friction of the parts when these are enlarged or diminished.

The ability of a support to resist the impetus of a moving body, is estimated by combining the pressure which it is able to bear with the distance through which it can yield ere disruption take place. In the case of a support which acts longitudinally, the strength is proportional to the square of the linear dimensions, while the distance through which it can yield is as the linear dimension itself. Altogether, then, the ability to resist a blow is proportional to the cube of the length; that is, to the weight of the body which it is destined to act upon. If, then, the linear velocity of the machine is to be the same with that of the model, these parts, so far as this action is concerned, will be in keeping with each other.

In the case, however, of a lateral support, the distance through which it can yield without breaking is not augmented by an enlargement of the scale; so that, in these parts, the large engine is comparatively weak, even although the velocity of the motion be the same on the large as on the small scale.

But those motions which are most likely to produce accidents in this way, are generated by descents bearing a fixed proportion to the dimension of the engine: the velocity, therefore, is generally greater in the large engine than in the small one, so that large machines are more liable to accidents arising from the derangement of any of their motions than small ones are: they possess, however, more absolute strength, and are better able to resist any extraneous force. We must carefully distinguish between the absolute strength of any structure, or the power which it has of resisting impressions from without, and the ability of that structure to withstand the effects of derangement among its own parts.

Every one knows that a thermometer bulb is broken by a very slight blow, and that yet it may fall from a considerable height without injury. Yet a large ball of a proportionate thickness, though able to resist a much severer blow, is dashed to pieces by a fall. The insect is crushed by a touch; yet many species of insects possess the power of leaping to distances inconceivable, when compared with the minuteness of the animal.

Whether we consider its ability to resist mere pressure, or its ability to resist an impulse, the performance of an engine is not at all commensurate with that of its model. It remains for me to show, that as great a disparity is perceived when we consider the friction of the parts. As, perhaps, I have been rather general in my previous statements, I shall, when speaking of the friction, confine my attention to that very important instrument, the steam engine. A little consideration will enable any one to apply similar remarks to other machines.

The steam engine moves on account of the pressure of the steam

against the surface of the piston; which pressure may be estimated at about ten pounds per circular inch. The friction which this pressure has to overcome may be divided into three parts: the first including all friction caused by the packing of the piston and stuffing boxes, and which is proportional to the linear dimensions simply; the second including that part of the friction on the gudgeons which arises from the pressure of the steam upon the piston, and all other friction proportional to the square of the linear dimension; and the third including all that friction which arises from the weight of the parts, and which is thus proportional to the cube of the dimension.

Suppose now, for the sake of an example, that, in an engine whose cylinder is 20 inches across, and whose inciting pressure will thus be 4000 lbs., the friction of each kind is 100 lbs., the entire friction being thus 300 lbs., or about one-thirteenth part of the moving force. And, to make a handsome enlargement at once, let us propose one of which this may be a mere model, on the scale of 20 to 1; the new cylinder will be 4000 inches in diameter, and the pressure on the piston 1,600,000 lbs. The friction of the first species would amount to 2000, that of the second to 40,000, and that of the third to 800,000 lbs., so that the sum total of the friction, no less than 842,000 lbs., would be fully more than half of the inciting pressure.

It is then clear that such an enormous engine would be highly disadvantageous as a mechanical agent, and that if the enlargement were pushed a little farther, the whole of the moving force would be expended in overcoming the friction. There is, then, a greatest size beyond which it is impossible to proceed in the construction of the steam engine. But there is also a least.

Let us, in fact, take an engine similar to our first, but with a cylinder of only one inch in diameter. In such an engine the pressure of the steam upon the piston would be only 10 lbs.; the three kinds of friction would amount respectively to 5 lbs. 1 qr. and 1-80th part of a lb., the first kind alone being equal to half the inciting force. Were the diminution still further continued, the friction of the packing of the piston might equal the pressure of the steam.

From this it is apparent that, for each shape of steam engine, there are two extreme limits as to size, at which the utility of the engine ceases altogether, and between which there is placed a best size, or one which is accompanied by the most complete development of the powers of the instrument. A skilful arrangement of the parts may indeed, extend the limits both ways, and may thus change, considerably, the most advantageous size, yet, even with that assistance, very small or very large engines are less productive of force, in proportion to the quantity of coal they consume, than moderately sized ones are; and, in many instances, it would have been better to have employed two or three middle-sized engines than a single one possessed of two or three times the nominal power.

Every instrument, whether it be used for the generation or for the transference of power, has a best size, and a best form. The contemplation of the whole animal and vegetable kingdoms teaches this truth. Each species of animal attains to a determinate size, be-

yond which it seldom proceeds, and short of which it seldom stops, unless man has interfered with the regular course of nature, and deranged, as his contrivances too often do, that determinate succession of events which is conspicuous in the history of each tribe of what we are pleased to call the lower animals. Each animal and each vegetable, in its progress from infancy to maturity, assumes, at each stage of that progress, such a form as best assorts with the consolidation of its parts, and with the mode of its living. The wisdom and the benificence of this arrangement, and the skilfulness with which it is made, become the more apparent when we carry our contemplations beyond the globe which we inhabit to those other worlds which circulate round the same sun. Were man, in his present state, and with his present powers, planted on the surface of Jupiter, he would be crushed beneath his own weight: and if, on the surface of that planet, there do exist beings of the same structure and material as man, one of us would be a man-mountain among them. If, on the other hand, we were transported to the surface of the moon, or of one of the asteroïds, our strength would fit us for progressing rather in the manner of the grasshopper than of the man: bipeds, living and moving as we do, would there realize the counter vision of Gulliver.

The sizes, then, of the objects which, on the surface of this earth, surround us, are not fixed by chance, but determined by the immutable laws of nature; and, in every case, nature has pushed her exertions to the utmost. There is a limit, both ways, to the size of quadrupeds; there is a limit, both ways, to the size of birds; and, although myriads of insects may be as yet unknown, I hesitate not to affirm that, among these also, we have the double limit. These are not mere speculative truths; they teach us this useful and needful lesson, that there are bounds beyond which no ingenuity can carry us, and towards which we can only hope to approach. How often have men attempted to plume themselves with wings? How many years were spent in search of the golden secret? How many fortunes have been wasted in the contrivance of perpetual motions? And, to come nearer the present moment, how many have ruined themselves with the locomotive engine? This last is the bubble of the present day, and on it I shall make a few observations.

At the surface of Jupiter a steam engine of twenty horses' power would be unable to move: at the surface of our earth, one of perhaps 1000 horses' power might perform pretty well; but at the surface of the moon they might be made of, perhaps, 20,000 horses' power—supposing the pressures of the atmospheres in the three cases to be alike. On Jupiter a steam carriage would be an absolute chimera; on the earth it is barely possible; but on the moon nothing would be more usual. An intensity of gravitation slightly greater than that which the earth exerts, would altogether preclude the hope of obtaining a locomotive engine. As it is, on flat rail-roads they perform well; as the road becomes inclined, they become less practicable; and, on common roads, nothing but the most consummate skill in the selection and in the use of the material, as well as in the contrivance of the parts, can ever be successful in their construction. Security demands

strength, strength requires weight, weight increases the friction, friction calls for additional power, and power can be procured only by an increase of weight. To reconcile these conflicting claims is not the task for a beginner in mechanical contrivance, but for one well versed alike in the theory and in the practice of the arts. Models are of no use, for, although the model be able to climb a considerable ascent, that fact is no guarantee that the full-sized instrument will be able to follow its prototype. Let those who speculate on this matter remember that the elephant inhabits the plains, and leaves the mountains to be tenanted by the smaller tribes; and let them also recollect, for the fact bears more upon the subject than at first may appear, that the larger animals are most easily exterminated; that we have the fox and the rat, though the wolf be long since gone.

In the remarks which I have made, it has been my wish to place the subject in such a light as might enable all to perceive the importance of its bearings; and I have refrained from being practical, lest, in making myself better understood by some, I had rendered my meaning obscure to others. My intention throughout has been to inculcate the important truth, that no machine can ever be enlarged or diminished in proportion.

[*New Edinburgh Philos. Mag.*

Observations on the Ignis Fatuus, or Will-with-the-Wisp, Falling Stars, and Thunder Storms. By L. Blesson, *Major of Engineers, Berlin.*

The first time I saw the Ignis Fatuus, or Will-with-the-Wisp, was in a valley in the Forest of Gorbitz, in the Newmark. This valley cuts deeply in compact loam, and is marshy on its lower part. The water of the marsh is ferruginous, and covered with an iridescent crust. During the day bubbles of air were seen rising from it, and in the night blue flames were observed shooting from and playing over its surface. As I suspected that there was some connexion between these flames and the bubbles of air, I marked during the daytime where the latter rose up most abundantly, and repaired thither during the night; to my great joy I actually observed bluish purple flames, and did not hesitate to approach them. On reaching the spot they retired, and I pursued them in vain; all attempts to examine them closely were ineffectual. Some days of very rainy weather prevented further investigation, but afforded leisure for reflecting on their nature. I conjectured that the motion of the air on my approaching the spot, forced forward the burning gas, and remarked, that the flame burned darker, when it was blown aside; hence I concluded that a continuous thin stream of inflammable air was formed by these bubbles, which, once inflamed, continued to burn—but

which, owing to the paleness of the light of the flame, could not be observed during the day.

On another day, in the twilight, I went again to the place, where I awaited the approach of night: the flames became gradually visible, but redder than formerly, thus showing that they burnt also during the day: I approached nearer, and they retired. Convinced that they would return again to the place of their origin when the agitation of the air ceased, I remained stationary and motionless, and observed them again gradually approach. As I could easily reach them, it occurred to me to attempt to light paper by means of them, but for some time I did not succeed in this experiment, which I found was owing to my breathing. I therefore held my face from the flame, and also interposed a piece of cloth as a screen; on doing which I was able to singe paper, which became brown coloured and covered with a viscous moisture. I next used a narrow slip of paper, and enjoyed the pleasure of seeing it take fire. The gas was evidently inflammable, and not a phosphorescent luminous one, as some have maintained. But how do these lights originate? After some reflection I resolved to make the experiment of extinguishing them. I followed the flame; I brought it so far from the marsh, that probably the thread of connexion, if I may so express myself, was broken, and it was extinguished. But scarcely a few minutes had elapsed, when it was again renewed at its source (over the air bubbles) without my being able to observe any transition from the neighbouring flames, many of which were burning in the valley. I repeated the experiment frequently, and always with success. The dawn approached, and the flames, which to me appeared to approach nearer to the earth, gradually disappeared.

On the following evening I went to the spot, and kindled a fire on the side of the valley, in order to have an opportunity of trying to inflame the gas. As on the evening before, I first extinguished the flame, and then hastened with a torch to the spot whence the gas bubbled up, when instantaneously a kind of explosion was heard, and a red light was seen over eight or nine square feet of the surface of the marsh, which diminished to a small blue flame, from two and a half to three feet in height, that continued to burn with an unsteady motion. It was therefore no longer doubtful that this ignis fatuus was caused by the evolution of inflammable gas from the marsh.

In the year 1811, I was at Malapane, in Upper Silesia, and passed several nights in the forest, because ignis fatui were observed there. I succeeded in extinguishing and inflaming the gas, but could not inflame paper or thin shavings of wood with it. In the course of the same year I repeated my experiments in the Konski forests, in Poland. The flame was darker coloured than usual, but I was not able to inflame either paper or wood shavings with it; on the contrary, their surface became speedily covered with a viscous moisture.

In the year 1812, I spent half a night in the Rubenzahl Garden, on the ridge of the Reisengebrige, close on the Schneekoppe, which constantly exhibits the Will-with-the-Wisp, but having a very pale co-

lour. The flame appeared and disappeared, but was so mobile that I could never approach sufficiently near to enable me to set fire to any thing with it.

In the course of the same year I visited a place at Walkenried, in the Hartz, where these lights are said always to occur; they were very much like those of the Neumark, and I collected some of the gas in a flask. On the day after, I found by experiment that it occasioned cloudiness in lime water, a proof of its containing carbonic acid.

I observed accidentally another phenomenon allied to this, at the Porta Westphalica, near Minden. On the third of August, 1814, we played off a fire-work from the summit, to which we had ascended during the dark, and where no ignis fatuus was visible. But scarcely had we fired off the first rocket, when a number of small red flames were observed around us below the summit, which, however, speedily extinguished—to be succeeded by others on the firing of the next rocket.

These facts induced me to separate the ignis fatui from the luminous meteors, and to free them from all connexion with electricity. They are of a chemical nature, and become inflamed on coming in contact with the atmosphere, owing to the nature of their constitution.

I think it highly probable that the fires that sometimes break out in forests are caused by these lights.

Falling Stars.—I have frequently observed on meadows and fields that slimy leek-green matter, which is commonly taken for the product of falling stars, fire-balls, &c. It speedily passes into a state of putrefaction, and dissolves into a whitish form, which at length disappears. I cannot venture to speculate on its formation. This slime appears to me to be intimately connected with the plants which generally surround it, although I cannot deny its flattened roundish shape. Once, indeed, I observed it on the bare ground, at a distance from vegetables of every kind. In Finland, I observed it on rocks, but they were richly clothed with mosses. Whatever opinion may be formed as to it, the plants, particularly the cryptogamic ones in its vicinity, ought to be examined. I may add, that I observed this jelly in a forest under a fir tree, where there was no possibility of its having fallen from the sky.*

Thunder Storm.—On ascending a mountain which rises rather more than 2000 feet above Teschen, I encountered a storm, concerning which the following particulars are not without interest. The wind blew from the south, and, shortly after I commenced my ascent enveloped the upper part of the mountain in clouds. The oppressive feel of the air seemed to announce a coming thunder storm, but hitherto neither thunder nor lightning had occurred. The nearer I approached to the clouds, the darker was their colour, but still the sun

* The so called *Star-jelly* is said to be a kind of fungus, Actiomyce Horkelli. —*Vide* Oken Isis, 1830. ii. 135.

shone brightly upon Teschen. The clouds, as seen from below, which exhibited a remarkable rotatory motion, appeared sharply bounded, and I was therefore surprised, when I came near to them, to find, as usual, only a gradually denser and denser cloud, which speedily wet me through. A particular rotatory wind appeared to prevail in this region (above half way up the mountain,) occasioning a piercing cold, which was the more striking, as contrasted with the sultry heat and stillness below the clouds.

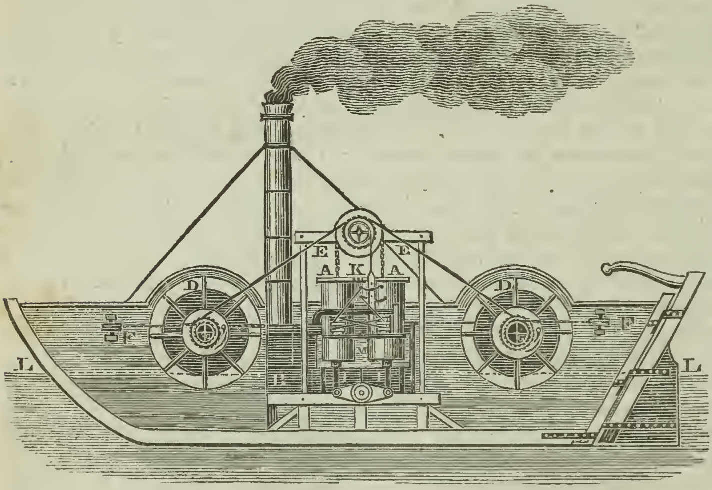
I had hardly entered the denser part of the cloud, when it was so dark, that I could with difficulty distinguish an object at my foot—(I name this dark, because I do not know any other expression for it; it is not, however, want of light; we have a white veil before us, which is constantly moving with a rotatory motion, which we cannot compare with any thing else.) I was scarcely in the cloud before I felt throughout my whole body a kind of expansive tension, which was excessively oppressive, and seemed to affect the walking of my companion, a poodle dog, even more than it did myself. The hair appeared to bristle up, and it seemed to me as if something was drawn out of the whole of my body. But this electric tension was of a very different character from that from an isolator. I bent down, in order to see the grass that surrounded me, and on which no dew was observed,—when I was suddenly enveloped in a bright sea of light, with a yellow lustre, and perceived, along with a violent noise, a sudden cessation of the former tension. The noise may be best compared with a distant dull cannon shot, only more continuous and louder, or may be compared with the explosion in a mine; but no rolling was heard. The grass was in motion, but I was too much surprised and confounded to make more particular observations. The convulsive motion of the cloud ceased for a moment, but immediately began again, and with it the tension was renewed. During the moments of rotation, the vaporic particles appeared to be arranged in rows into fibres, which moved still more violently amongst each other,—and after the explosion all was again calm, and a mere fog or cloud was visible. My poodle dog was the first object of my attention; it seemed to me to be thicker than usual, and his hair bristled up; I stroked it several times, and saw it bristle up under my hand. A new flash of lightning took place, and I could distinctly perceive, notwithstanding the light, that the whole body of my dog glimmered with a peculiar lustre, the hair, formerly bristled up, now fell flat, and he sunk down on his knees. This was a consequence of the stronger streaming of electricity from him than I experienced, and which seemed, as it were, to draw me from the mountain. Although during the tension, the feeling of drawing out was continuous and always increasing in intensity, still it was strongest at the moment when the electrical discharge took place; the hair bristled up more, and I felt something, as it were, passing from out my interior, and instantaneously all was passed, and the hair flat again. On the next flash of lightning, I noticed the appearance of the grass; on the discharge it appeared shining at its extremities; it became erect, when I felt the tension in-

creasing in my body, but became gradually wet, and then sunk down again. [*Ibid.*

First British Experiment in Steam Navigation.

Sir,—The accompanying sketch, fig. 1, represents a lateral section of the original steam-boat, invented by my father, the late William Symington, and the efficiency of which was twice proved, though on different scales of magnitude, by him, viz. once in 1788, on Dalswinton Lake, Dumfriesshire—and another time, in 1789, on the Forth and Clyde Canal.

Fig. 1



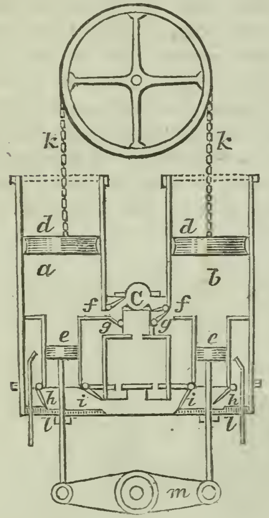
Description.

A A, the two cylinders. B, the boiler. C, steam pipe. D D, paddle wheels, situated and wrought in a trough extending from the stem to the stern of the boat, which trough allowed free ingress and egress to the water. E E, connecting chains. F F, direction pullies. G G, ratchet wheels, which communicated motion to the paddle wheels. I I, lower piston rods. H, beam. K, plug-frame and hand gear. L L, flotation line. M, water cistern.

The merit of these exemplifications has been in several publications erroneously awarded to the late Patrick Miller, Esq. The engine was of a peculiar construction, partly for the purpose of avoiding infringement on Mr. Watt's patent rights. It had two cylinders on

atmospheric principles, each cylinder having two pistons, the lower of which acted as an air-pump. The more clearly to illustrate the principles of this part of the machinery, a section of the two cylinders is exhibited at fig. 2. *a* and *b* are the cylinders, *a* being in the act of receiving, and *b* of condensing steam; *c* the steam-pipe; *d d*, atmospheric pistons, producing, by their alternate action on the ratchet wheels, rotary motion; *e e*, exhausting pistons; *f f*, steam valves; *g g*, exhausting valves; *h h* foot valves; *i i*, discharge valves; *k k* connecting chain; *l l*, injecting pipes; *m*, beam. From this sketch it must be evident, that while the steam is elevating the atmospheric piston of either cylinder, the lower piston is necessarily depressed, and performs the exhausting stroke of the opposite cylinder, both pistons, being connected by means of the beam.

Fig. 2.



The exemplification of 1789 was propelled by the power of steam at the rate of six miles an hour; thus satisfactorily proving that the performance of the *Charlotte Dundas* in 1802, as a tug, was *not* "the first public trial of steam for a useful purpose in navigation," as asserted in a report of the Forth and Clyde Canal Committee, contained in your Magazine of July 9, 1831.

Sensible of the readiness with which you have inserted my former communications, and perfectly prepared to substantiate every particular which I have advanced,

I am, &c.

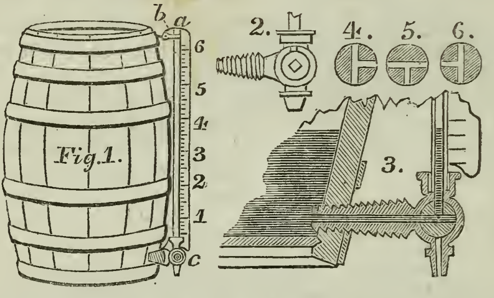
Bromley, Nov. 17, 1832. William Symington.

[*Mech. Mag.*

Hennekey's Gauge for Standing Casks.

We extract from the last part of the "Transactions of the Society of Arts" the following more particular description of the new mode of gauging casks introduced by Mr. Hennekey, of High Holborn, of which we quoted a brief notice from Mr. Babbage's "Economy of Machinery," in our last volume, p. 215. The invention is of such manifest utility, that it can scarcely fail to come into universal use; and has very deservedly obtained for the inventor the honour of the society's silver Isis medal.

Fig. 1 is an elevation of a cask with the gauge applied to it. Fig. 2 is the cock *c* in fig. 1, on a larger scale, it has three openings, one above, one below, and one in the side; by means of the screw in the latter opening, it is fixed firmly into the cask, as shown in the section, fig. 3. An upright wooden bar is then secured to the outside of the cask, having a groove *b* in it corresponding with, and being, as it were, a continuation of the upper pipe of the cock *c*; in this groove is placed a glass tube, open at both ends, the lower part of which drops into the upper pipe of the cock, and is fixed there by means of white lead, or any other cement not acted on by spirit or by water; the tube is also secured above by a ring or cap. Parallel with the tube is a brass plate, on which the divisions are subsequently to be marked. The plug of the cock has three ways, or openings, as shown in figs. 3, 4, 5, 6. A tongue, or index, projects from the plug, indicating the position of one of these ways; it may be seen in fig. 2; the position of which corresponds with that of the sectional view, fig. 3.



The apparatus being complete as above described, the cock is turned to the position fig. 3, and the cask is filled by a hole at the top. It is evident, therefore, that the liquor will stand in the tubes at the same height it does in the cask, provided the tube is wide enough to avoid any sensible error from capillary attraction: this height is marked as the *b* or zero of the scale. The plug of the cock is then turned to the position fig. 6, and a given measure is drawn off, forming the unit of the scale. In the large standing casks, the quantity that is found practically the most convenient is five gallons. The plug is then returned to its former position, and the column of liquor in the tube will now be lower than the zero; the point at which it stands is to be marked on the scale as before. Proceeding in this manner to draw off successively five gallons at a time, the whole contents of the cask are thus transferred to the scale, each division of which represents five gallons, and the scale may be numbered upwards or downwards, as may be found most convenient. The scale should not be continued to the bottom of the tube, but should terminate at the point where the dregs are usually found to begin. It is best not to leave a column of liquor constantly in the tube, as a deposit in that case takes place on the inside, which obscures it; when,

therefore, any liquor has been drawn off, the plug of the cock should be brought to the position fig. 4, and previously to drawing off a fresh quantity, the plug should be brought to the position fig. 6.

By the adoption of this method of graduation, the liquor dealer may take stock every day, in a few minutes, by merely turning the plugs to the position fig: 3, and then reading the number corresponding with the height of liquor in the glass to be attached to each cask.

Mr. Hennekey also finds these graduated casks to save much time, and give greater precision, in making different liquids to form those compounds which are required by his customers. If, for example, he wants to mix together spirit and sirop in any given proportion, he puts the two liquors into separate casks on the ground floor, and places an empty cask, also graduated, on the platform above, and then pumps from the lower casks into the upper one, the determinate quantity of each ingredient; he then allows the mixture to remain for twenty-four hours, after which he reads off the quantity, and by comparing this with the previously known quantity of the separate ingredients, ascertains how much has been lost in volume by condensation, and therefore how much additional price must be charged as an equivalent. [*Ibid.*

Improved Pill Boxes.

A patent has recently been granted to Messrs. Mosley and Bell, of Wandsworth, Surry, for a new mode of manufacturing pill boxes by machinery. The forms of these boxes are produced by pressure with dies; they are made of thick paper, and appear extremely neat, having embossed surfaces. The sides of the boxes are of the same piece as the tops or bottoms, and without joints, which prevents the inconvenience so much complained of in the former pill boxes, where the tops and bottoms being only stuck into the rim which constitute the sides of the boxes, were perpetually falling out, and consequently rendering the boxes useless, to the very great inconvenience and loss of the druggist.

Insignificant as this article may appear, we understand that the demand amounts to many thousand gros per annum, and that a very great number of children are employed in the manufacture.

[*Lond. Jour.*

Paddington and London Steam Carriage Company.

The first carriage of this company was exercised along the Mile-End, Hackney, and city roads, on Saturday last (26th Jan.) about noon; and is now in the painter's hands, City-road, for completion, which is expected to be in about a month, when it will commence

running on the road, but only for a few journeys per day until two more carriages are completed, when the whole will ply regularly between Paddington and the city. It was thought by the managers prudent to see one carriage actually in action, in a finished state, before the others were put in hand, in order that they might avail themselves of any improvements that the performances of the first may suggest. [*Mech. Mag.*

Saltash Steam Floating Bridge.

A bridge at the Saltash Ferry has long been ardently desired by the public, and an endless variety of plans propounded by the influential gentlemen in the vicinity had proved abortive. To hit upon an expedient which should perfect the land conveyance between the two counties, without interfering with the navigation on the river, and the restrictions of government, was given up as hopeless; still, from the spirit of enterprise, (the river Dart havingfirst become tributary,) the Tamar at last yields to science and the arts. The float forms a parallelogram of about fifty feet by thirty feet, open at both ends; the centre is occupied by two engines of six horse power each, boxed over from end to end, so as to be entirely concealed externally; the engines work two weeels, on which rest two chains, which are laid from shore to shore and traverse through the engine room. On either side the engine room is a clear space of fifty feet by ten, for carriages, horses, cattle, and foot passengers. Carriages of every description are run in and out without detaching the horse; and the passage is accomplished in five minutes. The prows, or platforms, for shipping and landing are four in number, two at each end, each twenty-one feet long by ten. They are so arranged as to drop on the shore, and forms almost a level platform. [*Devonport Telegraph.*

Magic Lanterns.—Etching.

The difficulty of procuring good transparent varnishes in the country, and of laying them on, is so great, that good slides for magic lanterns are seldom made out of London. I send you, therefore, an account of two different methods that I have made use of for some time, by either of which this difficulty is obviated, and any persons who can draw or etch may make excellent slides for themselves.

1. Take a piece of crown glass and grind it to a uniform surface, free from scratches, with washed flour of emery. Lay it on the subject to be copied, and trace the outline with a good cedar pencil; then bring out the middle lights by rubbing the parts with a piece of soft wood, such as a skewer; produce the shades with the cedar pencil, softening them off with a pointed cork or roll of paper, and touch the

high lights with a little mastic varnish; then black up to the outline with lampblack and turpentine varnish. By this means, statues, skeletons, &c. may be worked up to a greater pitch than they can be with the varnish.

2. By my second method, the finest engravings may be introduced. Ink the plate with the best printers' ink, or apply coloured varnishes to the different parts, and carefully rub them off without mixing them; then pour on a clear solution of isinglass in weak spirits of wine, about the thickness of a shilling. In about twelve hours it may be taken off, and then fixed on a piece of glass, and blacked up to the outline.

I have no doubt that many persons would learn to etch if it were not for the expense of the copperplates and the trouble of sending to the printers for impressions. I have found that common tin-plate will answer very well for learning upon, and that impressions may be taken in a smith's vice between two pieces of flat, thick cast iron. The plate, however, must not be larger than a card. Choose the plate free from scratches; then cover it with etching ground or bees' wax; trace the subject in the usual way; put on the border of wax, and in biting in use rather a weaker acid, five or six parts of water to one of nitric acid; do not let it remain so long as on copper; the light parts must be stopped out in time, as the acid acts quickly upon it.

[*Mech. Mag.*

¶ POPULAR SCIENCE.

No. IV.

Selections from Brewster's Optics.*

Decomposition of Light by Absorption.

If we measure the quantity of light which is reflected from the surfaces and transmitted through the substance of transparent bodies, we shall find that the sum of these quantities is always less than the quantity of light which falls upon the body. Hence we may conclude that a certain portion of light is *lost* in passing through the most transparent bodies. This loss arises from two causes. A part of the light is scattered in all directions by irregular reflection from the imperfectly polished surface of particular media, or from the imperfect union of its parts; while another, and generally a greater portion, is *absorbed*, or stopped by the particles of the body. Coloured fluids, such as black, and red ink, though equally homogeneous, stop, or absorb, different kinds of rays, and when exposed to the sun they become heated in different degrees; while pure water seems to transmit all the rays equally, and scarcely receives any heat from the passing light of the sun.

* American edition: Carey, Lea, & Blanchard, Philadelphia.

When we examine more minutely the action of coloured glasses and coloured fluids in absorbing light, many remarkable phenomena present themselves, which throw much light upon this curious subject.

If we take a piece of blue glass, like that generally used for finger glasses, and transmit through it a beam of white light, the light will be a fine deep blue. This blue is not a simple homogeneous colour, like the blue or indigo of the spectrum, but is a mixture of all the colours of white light which the glass has not absorbed; and the colours which the glass has absorbed are those which the blue wants of white light, or which, when mixed with this blue, would form white light. In order to determine what these colours are, let us transmit through the blue glass the prismatic spectrum; or, what is the same thing, let the observer place his eye behind a prism and look through it at the sun, or rather at a circular aperture made in the window shutter of a dark room. He will then see through the prism a spectrum far below the aperture. Let the blue glass be now interposed between the eye and the prism, and a remarkable spectrum will be seen, deficient in a certain number of its differently coloured rays. A particular thickness absorbs the middle of the red space, the whole of the orange, a great part of the green, a considerable part of the blue, a little of the indigo, and very little of the violet. The yellow space, which has not been much absorbed, has *increased in breadth.* It occupies part of the space formerly covered by the orange on one side, and part of the space formerly covered by the green on the other. Hence it follows that the blue glass has absorbed the red light, which when mixed with the yellow light, constituted orange, and has absorbed also the blue light, which, when mixed with the yellow, constituted the part of the green space next to the yellow. We have, therefore, by absorption, decomposed green light into yellow and blue, and orange light into yellow and red; and it consequently follows, that the orange and green rays of the spectrum, though they cannot be decomposed by prismatic refraction, can be decomposed by absorption, and actually consist of two different colours possessing the same degree of refrangibility. *Difference of colour is, therefore, not a test of difference of refrangibility*, and the conclusion deduced by Newton is no longer admissible as a general truth: "That to the same degree of refrangibility ever belongs the same colour, and to the same colour ever belongs the same degree of refrangibility."

With the view of obtaining a complete analysis of the spectrum, I have examined the spectra produced by various bodies, and the changes which they undergo by absorption when viewed through various coloured media, and I find that the colour of every part of the spectrum may be changed not only in intensity, but in colour, by the action of particular media; and from these observations, which it would be out of place here to detail, I conclude that the solar spectrum consists of three spectra of equal lengths, viz. a red spectrum, a yellow spectrum, and a blue spectrum. The primary red spectrum has its maximum of intensity about the middle of the red space in

the solar spectrum, the primary yellow spectrum has its maximum in the middle of the yellow space, and the primary blue spectrum has its maximum between the blue and the indigo space. The true minima of each of the three primary spectra coincide at the two extremities of the solar spectrum.

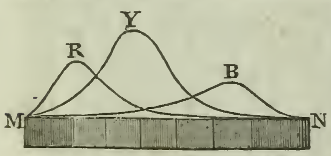
From this view of the constitution of the solar spectrum we may draw the following conclusions:—

1. Red, yellow, and blue light exist at every point of the solar spectrum.

2. As a certain portion of red, yellow, and blue, constitutes white light, the colour of every point of the spectrum may be considered as consisting of the predominating colour at any point mixed with white light. In the red space there is more red than is necessary to make white light with the small portions of yellow and blue which exist there; in the yellow space there is more yellow than is necessary to make white light with the red and blue; and in the part of the blue space which appears violet, there is more red than yellow, and hence the excess of red forms a violet with the blue.

3. By absorbing the excess of any colour at any point of the spectrum above what is necessary to form white light, we may actually cause white light to appear at that point, and this white light will possess the remarkable property of remaining white after any number of refractions, and of being decomposable only by absorption. Such a white light I have succeeded in developing in different parts of the spectrum. These views harmonize in a remarkable manner with the hypothesis of three colours, which has been adopted by many philosophers, and which others had rejected from its incompatibility with the phenomena of the spectrum.

The existence of three primary colours in the spectrum, and the mode in which they produce, by their combination, the seven secondary or compound colours which are developed by the prism, will be understood from the annexed figure, where M N is the prismatic spectrum consisting of three primary spectra of the same lengths, M N, viz. a red, a yellow, and a blue spectrum. The red spectrum has its maximum intensity at R, and this intensity may be represented by the distance of the point R from M N.



The intensity declines rapidly to M and slowly to N, at both of which points it vanishes. The yellow spectrum has its maximum intensity at Y, the intensity declining to *zero* at M and N; and the blue has its maximum intensity at B, declining to nothing at M and N. The general curve which represents the total illumination at any point will be outside of these three curves, and its ordinate at any point will be equal to the sum of the three ordinates at the same point. Thus the ordinate of the general curve at the point Y will be equal to the ordinate of the yellow curve, which we may suppose to be ten, added to that of the red curve, which may be 2, and that of the blue, which may be 1. Hence the general ordinate will be 13. Now, if we sup-

pose that 3 parts of yellow, 2 of red, and 1 of blue make white, we shall have the colour at Y equal to $3+2+1$, equal to 6 parts of white mixed with 7 parts of yellow; that is, the compound tint at Y will be a bright yellow without any trace of red or blue. As these colours all occupy the same place in the spectrum, they cannot be separated by the prism; and if we could find a coloured glass which would absorb seven parts of the yellow, we should obtain at the point Y a white light which the prism could not decompose.

Meteorological Observations for April, 1833.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches.				Inches.	
	1	41°	68°	29.93	29.93	28°	W.	Moderate.		Hazy.
	2	40	70	.95	.95	32	W.	do.		Hazy.
	3	44	57	.90	.84	54	SE. S.	Calm.	0.32	Cloudy—showers.
☺	4	52	68	.63	.63	54	SW. W.	Moderate.		Fog—light clouds.
	5	50	59	.68	.60	39	W.	do.		Hazy--flying clouds.
	6	37	59	.85	.90	23	NW. S.	do.		Clear day.
	7	39	61	30.00	30.00	42	SE.	do.	0.35	Lightly cloudy—cloudy--rain.
	8	52	43	29.54	29.50	58	S.	do.	0.09	Cloudy—clear—shower.
	9	49	56	.64	.74	36	W.	Blustering.		Clear day.
	10	45	65	30.00	30.00	36	W.	Moderate.		Clear day.
☾	11	46	69	29.84	29.70	39	SE. S.	do.		Light clouds—lightly cloudy.
	12	49	74	.40	.30	52	SE. W.	Blustering.		Cloudy—flying clouds.
	13	37	46	.55	.60	20	NW.	do.		Flying clouds—clear.
	14	33	56	.80	.80	17	W.	do.		Clear day.
	15	32	54	30.04	30.10	24	NE. SE.	Moderate.		Clear—light clouds.
	16	36	55	.10	.10	32	E. SE.	do.		Lightly cloudy—do.
	17	41	49	29.93	29.93	40	SE. W.	do.	0.04	Drizzle. do.
	18	43	65	30.00	30.05	40	W. S.	do.		Clear day.
⊗	19	42	68	.20	.20	40	W.	do.		Clear day.
	20	46	69	.10	.10	39	S.	do.		Clear—hazy.
	21	50	71	29.94	29.80	49	SW.	do.		Fog—sultry.
	22	54	70	.70	.75	45	W.	do.		Lightly cloudy—clear.
	23	56	78	.75	.75	54	SW.	do.		Cloudy—hazy.
	24	40	49	.85	.85	34	E.	do.		Cloudy day.
	25	37	50	30.03	30.00	36	W.	do.		Clear—cloudy.
☽	26	38	61	.00	.04	33	W.	do.		Clear day.
	27	36	64	.16	.20	36	SE.	do.		Clear—light frost—clear.
	28	44	72	.20	.10	40	S. SW.	do.		Light clouds—do.
	29	51	82	.00	29.96	57	SW. S.	do.		Light clouds—hazy.
	30	54	88	29.90	.90	57	SW.	do.		Light clouds—hazy.
	Mean	43.80	61.20	29.89	29.87	39.5			1.80	

	Thermometer.	Barometer.
Maximum height during the month,	88. on 30th.	30.20 on 19th, 27th, & 28th.
Minimum do. . .	32. on 15th.	29.30 on 1st.
Mean do. . .	52.50 . .	29.88

INDEX.

AMERICAN PATENTS, LIST OF, WITH EDITOR'S REMARKS, &c.

ERRATA.

Page 84 line 17 *for* Laninez *read* Laissez.
" 93 dele the note at the bottom.
" 96 line 10 *for* Blanvelt *read* Blauvelt.
" 127 Note, *for* Eaude *read* Eau de.
" 209 dele *Hot Air Blast* in the running title.
" 300 line 36 *for* roller *read* rolled.
" 319 dele line 9 and *read* see specification, p. 180.
" 330 to 338 require 2 subtracted from each.

There are several other obvious mistakes, which are unavoidable, as the distance of the Editor from the press prevents his seeing a corrected proof.